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HYDATIDS:

AVOIDABLE BY MEANS OF PROPER PREVENTIVE MEASURES.

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HYDATID disease constitutes a serious trouble for the human race, and, seeing that the adoption of adequate measures would, if effectively carried out, largely prevent its occurrence, it is of the greatest importance that the public, especially dog-owners, should become fully acquainted with its nature, the manner in which it is caused, and the measures necessary for its prevention.

The disease occurs as a result of the development in the human body of what are termed hydatid cysts. These are bladder-like bodies which constitute the first stage in the development

from the egg of a particular variety of tapeworm (technically known as *Taenia echinococcus*) which commonly infests the bowels of dogs. Human beings do not alone act as the involuntary hosts of this parasite: some of the lower animals—cattle, sheep, pigs, and rabbits—are also liable to invasion, though these usually suffer less in health in consequence.

APPEARANCE OF A HYDATID CYST.

These cysts resemble in appearance bladders varying in size and distended with a watery-looking fluid. They are more or less regularly rounded in shape, and sometimes are present in large numbers in the one person or animal. The wall of the cyst is thin and distended by the contained fluid, so that if it be punctured with the point of a knife-blade the contents squirt out with some force. The cysts are most commonly found in the lungs and the liver, but any organ of the body as well as other of the body-tissues may be affected by them. In cattle it is by no means uncommon to find a hydatid cyst in the muscle of the heart, almost invariably (in our experience in New Zealand) near the apex of the left ventricle. (It is a matter of further interest to note that no case has yet come under our notice in which death has occurred as a result of this.) The specimens met with have been in cattle, apparently healthy, which have been slaughtered in abattoirs, &c.

THE BEARING OF HYDATID AFFECTION OF THE LOWER ANIMALS UPON THE HEALTH OF MEAT-CONSUMERS.

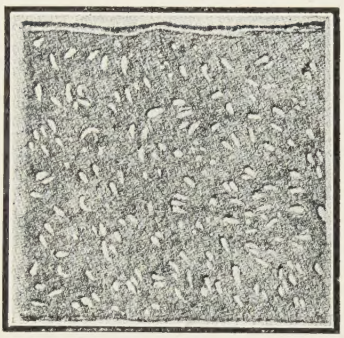
The presence of these cysts in the internal organs or tissues of cattle, sheep, pigs, or rabbits* does not constitute any danger to the health of human beings consuming their flesh. As will be shown later, these cysts develop only as a result of taking into the system the ova (eggs) of the tapeworm. By far the greater majority of food animals in whose bodies hydatid cysts are present do not appear to suffer in health to any noticeable degree in consequence. Their bodies remain well nourished, and, so far as their flesh is concerned, they are perfectly healthy. Individual cases occur in which one or more of the vital organs are so badly infested as to cause serious impairment of their natural functions, and then sickness or weakness and emaciation will follow. But the carcases of such animals would not be

* The rabbit is more frequently affected with another variety of hydatid cyst (*Coenurus serialis*), the immature form of *Taenia serialis*, a tapeworm of the dog. It is without danger to human beings.

allowed to be used for human consumption, since the inferior and innutritious nature of the flesh renders it unfit for food. The cysts themselves do not constitute a danger—they can only continue their injurious course when the part containing them is swallowed raw by a dog.

NATURE OF THE CYSTS.

In their simplest form the cysts or hydatids are composed of a thin-walled translucent membrane comprising two distinct layers—(1) An outer cuticular layer of moderately tough consistency; (2) a delicate internal lining or germinal layer. Enclosed by these membranes is the clear watery liquid already referred to.



TAENIA ECHINOCOCCUS.
Mucus membrane of a portion of the intestine covered with parasites. — From the work of Dr. Muller and A. Glass.

The inner or germinal layer carries a number of small pinhead bladders attached to it by a stalk or floating free in the liquid; and these in turn, if magnified, may be seen also to contain a number of microscopic pear-shaped bodies attached to their inner surface by a short stalk. Each of these is in reality the immature head of a tapeworm, and is capable of developing into the mature worm only on reaching the inside of a dog.

HOW THE DOG BECOMES INFESTED WITH THE WORM.

When a piece of liver, lung, or any other organ containing these cysts is given raw to a dog, that dog is almost certain to become the host of a large number of tapeworms, because the tiny heads, when they reach the intestine, fasten themselves to the inside lining of the bowel by means of a number of hooklets and suckers with which they are furnished, and grow into adult tapeworms. Old dogs are more likely to harbour the parasites than younger ones. Cats may become infected in a similar manner.

APPEARANCE OF THE TAPEWORM.

The particular worm which is directly responsible for the dissemination of hydatid disease represents the smallest known species of parasite of its class. Even when fully matured it

measures only about $\frac{1}{3}$ in. It inhabits the small bowel of the dog or cat, but, owing to its minute proportions, it is frequently overlooked even when search is made for it in the bowel after the animal's death. Each worm consists of three or four segments, including the head. The last segment contains the ripe eggs.

How Human Beings and the Lower Animals contract Hydatid Disease.

When the worm is fully developed in the bowel of the dog the last segment of it becomes detached and is passed out from the anus. The loss of this segment is made up by the worm through the formation of another one which develops behind the head of the parasite, the head remaining attached to the lining of the intestine. The mature detached segment, packed with eggs, may be deposited by the dog on to pasture land or near the edges of streams and watercourses, whence it may be conveyed to places remote from where it was originally dropped. Water and vegetables may thus become contaminated, or the dog may actually void the segment of worm directly in the vegetable-garden. Whenever cattle, sheep, rabbits, pigs, or man swallow these eggs, either in the drinking-water or when eating uncooked vegetable matter which has become soiled in this manner, they run the risk of becoming subjects of hydatid disease. The eggs when swallowed and acted upon by the digestive juices liberate the immature worm. This bores its way through the wall of the bowel, reaches the blood-stream or lymphatic circulation, and is thus conveyed to various organs of the body, there giving rise to the formation of hydatid cysts as already described. Infection may perhaps also occur directly from the dog, owing to the fondness these animals have of licking the face and hands of their owners and of children. Thus the dog may easily transmit the eggs of the tapeworm in its saliva, even though it may not itself harbour the parasite, on account of its habit of snuffing and licking other dogs which may be infested by the worm.

Effects of Hydatid Disease.

These are nearly always serious in the human subject. As already explained, any organ or part of the body may be attacked. The result depends upon the gradual growth of the cysts, the pressure produced in consequence, and their situation. Sometimes the cysts rupture and discharge their contents. Should this occur in the chest or abdominal cavities it generally ends in death. When bones are the seat of the disease distortion very often

follows, and the subject may thereby be crippled for life. The substance of the liver, lungs, or kidneys may be more or less displaced and destroyed as a result of the cystic growth, and the function of these organs arrested, with the most serious consequences to health. The cysts develop very slowly, so that it is possible for young children to become infected and yet not show definite signs of disease until much later in life. Occasionally the immature bladder worms die within the cyst, and the liquid contents becomes absorbed. The whole cyst then shrinks into an insignificant scar, but this happy termination cannot be relied upon to take place. Serious illness and death very often follow hydatid disease, and once the condition has been ascertained definitely to exist surgical operation is nearly always the rule; the operation is of necessity very often of a grave character.

PREVENTIVE MEASURES.

From the facts narrated above it will be realized that the prevention of hydatid disease rests largely in the hands of dog-owners, *particularly those engaged in pastoral pursuits.* The principal means by which the disease is perpetuated lies in the common practice of feeding dogs upon the internal organs (liver, lung, &c.) of cattle and sheep slaughtered on farms or elsewhere. The flesh (*i.e.*, the muscle) is very rarely affected, but the offal constitutes a serious source of danger in this respect. To be exact, raw offal should never be given to dogs, but it is hardly to be expected that shepherds, for instance, could cook all their dogs' food. Moreover, raw meat is a natural food for dogs. It is, however, urgently necessary that an examination should be made of any offal before it is thrown to them. If any hydatids be present, on no account should the dogs be allowed to consume it. Moreover, in the case of livers, it is not sufficient to rely upon outward appearances; a series of cuts must be made into each liver in order to be sure that no small cysts are present in its interior. In addition, carcases of cattle or sheep which have died in a paddock should not be left unburied for dogs to devour. Dogs should not be allowed to eat off or lick plates or other dishes which are subsequently utilized for table or domestic purposes. The foregoing remarks apply equally to cats. Water from creeks or streams which is liable to be contaminated by dogs should not be used for drinking purposes unless previously boiled or efficiently filtered. Salads and other vegetables or fruit liable to be soiled by dogs or watered from contaminated sources should not be partaken of. Children should be taught on no account to allow dogs to lick them, nor should

they be allowed to play with or fondle dogs which may harbour the parasite of hydatid disease.

Further, sheep and cattle dogs should be given regularly every three months a dose of worm-medicine to expel any worms which they may harbour. Among the remedies for this purpose either of the following will be found effective:—

(1.) Powdered areca-nut. Dose, 2 grains per pound body-weight; average dose, 1 dram. Powdered santonine, 3 to 10 grains, depending on size of dog; average dose, 5 grains. The areca-nut and santonine should be mixed together and then shaken up in a small medicine-bottle containing two tablespoonsful of warm milk. The mixture should be given to the dog in the morning after he has fasted from the morning before.

(2.) Tenaline, 20 to 120 drops, depending on the size of the dog; given in a little milk or water on a fasting stomach. The last-named preparation is a liquid extract of areca-nut containing its active principle. It is a very convenient and efficacious remedy for worms.

After being dosed, the dog should be let loose in a confined space. The medicine usually acts in the course of half an hour, but should the result in this respect not be satisfactory, a dose of castor-oil, generally about two tablespoonsful, should be given to accelerate its action. The droppings which are passed should be collected and disposed of by deep burial, or, better still, by burning.

Finally, we would emphasize the fact that hydatid disease is preventable if thorough and complete measures are adopted, and this responsibility rests upon those who own or have charge of dogs, and also, to a lesser degree, the owners of cats.

PRAIRIE-GRASS.

A SMALL paddock was sown with prairie-grass two years ago at the Ruakura Farm of Instruction, in order to determine its grazing possibilities, and, although the soil is exceptionally poor, the results of this experiment warrant a further test of this undoubtedly valuable grass. During winter in particular it has yielded an exceptional bulk of excellent feed which is relished by all stock. No doubt the best plan to adopt in depasturing this grass is to have it sown in comparatively small paddocks, so as to free them for a short time in succession, and thus prevent injury by continuous close grazing.—*Primrose McConnell.*

CALF-REARING.

J. L. BRUCE.

FOLLOWING upon a former article dealing with the bull and the important place he holds in the herd, and assuming that advantage has been taken of the benefits claimed through the proper selection and management of the bull and culling of the herd as set out in that article, only the first step towards entire success has been taken. As a matter of fact, the higher the standard of quality arrived at the greater the difficulty and necessity for rearing robust and healthy calves. Before the advent of the dairy industry the majority of calves were reared under natural conditions, but now, with this great and ever-expanding industry (rapidly becoming one of the chief industries of this country), it rests with man to provide an artificial substitute for the whole milk intended by nature for the rearing of the cows' progeny, so that the highest possible standard of development may be maintained.

As above indicated, there are two distinct methods of calf-rearing—viz., natural and artificial. Of the former little need be said, as the calf runs with its dam and is reared under natural conditions. It might, however, be remarked here that calves so reared retain the effects of their rearing, and can be distinguished by the experienced stockman from artificially fed calves after they reach maturity. Artificial feeding is and always has been a difficult matter. It is only within the last few years that any serious attempt has been made to provide the calf with a properly balanced diet resembling its mother's milk.

It is most essential to watch young calves, and be certain that they are not overdone. They should not be allowed to drink to repletion, but at the same time there should be no loss of condition. All pails and vessels used in the preparing of food must be scrupulously clean, and all food should be raised to blood-heat before being given to the calves.

During the first three weeks of life special care must be exercised; irregular feeding, long fasts, or an excessive allowance are the points to guard against.

The following from the pen of the late Rev. John Gillespie, who was an enthusiastic agriculturist and breeder of Black Galloways, is

exceedingly good advice, and coming from such an able man is bound to be sound: "Where pail feeding is followed, the person in charge must be thoroughly reliable and very painstaking. The food must be given with every scrupulous care and regularity; this is important when nothing but the natural food of new milk is given, but where the milk is supplemented by other articles and a mixed diet given, care and attention at every stage are of exceptional moment. If the ingredients are not used in the proper proportions, or the constituents are not evenly mixed; if the right quantity is not given to each calf or at the proper temperature—when some of these conditions are not complied with, and especially when all of them are neglected, the result cannot be but unsatisfactory."

After birth the calf should be removed from its mother, and, if she is not given the opportunity to lick it over, it should be well rubbed over with straw until practically dry, and given its first nourishment, the colostrum milk or "beestings," either from a narrow-necked bottle or horn, and later may be taught to drink from the bucket. If the weather should happen to be cold and wet, the calf should be put in a calf-pen with plenty of clean straw for a few days, when it could be removed to a well-sheltered new-grass paddock. This is important. More loss of life and general unprofitableness amongst young cattle are caused directly from keeping calves on foul old pastures and generally under unclean conditions than any other form of neglect. This cannot be too strongly emphasized. It is recognized that in bush districts there is considerable difficulty in bringing even a few acres of land under cultivation; at the same time nothing should be allowed to stand in the way of accomplishing this. The paddock should be sown down with the best of English grasses suitable to climate and soil. Wherever possible it should be of considerable area and retained exclusively for the use of calves.

Calves should never be fed collectively, but each animal should receive its allotted quantity individually. Food may be varied in quantity and composition according to the calf's individual requirements. Strange though it may appear, it is here where real skill can be demonstrated, and experience has shown that, although the dairy-farmer may be an excellent stockman, it is the womenfolk who hold the secret in rearing calves. Notwithstanding all that has been said or written concerning calf-feeding, the fact remains that no hard-and-fast rules can be laid down. The following procedure and food mixtures will be found good; but it must never be forgotten that no ingredient or mixture can without the application of thought and common-sense ever make calves do their best.

The calf should be given its mother's milk for the first week, and until it is three or four weeks old it should be given 1 quart of milk three times a day, increasing this gradually to 2 quarts after about the third day. After it is a week old the midday meal may consist of separated milk or whey mixed with some digestible food, warmed to blood-heat. There are some very good calf-foods on the market showing a well-balanced ration and giving excellent analysis, upon which calves thrive well; but, unless the composition is known, it would be well to trust to linseed and oatmeal or ground linseed-cake gruel. The cooking of these substances should be carefully attended to. Separated milk being deficient in fat, the food supplied must meet the loss, and this is being well provided by boiled linseed and meal. Calves should be fed regularly three times a day; they know feeding-time almost to the minute, and they should not be kept waiting. It does not pay either to starve or neglect them if they are to be made profitable in the future. At about five weeks old the calves, if they are on grass, will begin to nibble, and by the time they are eight weeks old they can be fed morning and night with separated milk to which the fat-substitute has been added, the whole being warmed to blood-heat. At three months old milk could be discontinued, and ground oil-cake, crushed oats, and bran may be given in the form of a mash. At four months old this may be stopped, and the calf allowed to remain permanently on grass, crushed oats, or a little oil-cake and hay, unless the pasture is exceptionally good.

A good substitute to be used with separated milk or whey is 6 parts oatmeal to 1 part ground linseed. Scald 2 lb. per calf of this mixture overnight with 5 pints of boiling water, boil for ten minutes next morning, adding 5 pints separated milk with $\frac{1}{4}$ oz. salt and 2 oz. brown sugar, dividing into three parts for the day's allowance.

Another method: First week, mother's milk only; second and third weeks, 3 pints new milk with 1 pint of linseed gruel or porridge at each of the three meals; fourth and fifth weeks, 2 pints new milk with 2 pints of linseed gruel or porridge at each of the three meals; sixth and seventh weeks, 1 pint of new milk with 3 pints of linseed gruel or porridge twice daily; eighth week, 2 quarts linseed gruel or porridge twice daily until four months old. Cost of whole milk, not counting first week's milk, about 15s.; linseed and meal, 7s.: total, £1 2s.

Another method: First week, mother's milk only; second week, 2 quarts whole milk three times daily; third and fourth weeks, 2 pints whole milk and 3 pints warm separated milk with $\frac{1}{2}$ pint linseed gruel or porridge three times daily; fifth to eighth week,

3 quarts warm separated milk with 1 quart linseed gruel or porridge three times daily, calf now taking grass, ninth to twelfth week, discontinue midday meal and linseed gruel or porridge—5 quarts separated milk morning and evening, with about ¼ lb. of linseed cake or crushed oats at midday; thirteenth to twentieth week, milk as above, with ¾ lb. linseed cake and crushed oats at midday; twenty-first week, milk as above, with 1 lb. linseed cake and crushed oats once daily. Cost of whole milk after first week, about 10s. 6d.; linseed-meal, crushed oats, and linseed cake, about 10s.: total, £1 0s. 6d.

Linseed gruel: 2 lb. whole linseed soaked overnight in 3 gallons of water; boil next day for twenty minutes, adding ½ lb. flour (which has been previously mixed to a smooth paste with cold water) five minutes before boiling is finished. This will keep sweet for a week or more.

Linseed porridge: Ground linseed to which maize-meal has been added in the proportion of 1 of meal to 7 of ground linseed (oatmeal can be substituted for maize-meal). This is scalded and stirred well. One gallon of boiling water to 1 quart of meal and ground linseed in the above proportion. This is more quickly prepared than linseed gruel, and is recommended. Linseed cake is sometimes used instead of ground linseed, but, although a wholesome food, it does not enrich the milk with fat as linseed does.

A few more recipes for substitutes: 3 quarts of linseed-meal, 4 quarts of bean-meal, 30 quarts of boiling water. Cover up for twenty-four hours. This is given with skim-milk at blood-heat. Equal proportions of mixture and skim-milk.

Oatmeal ⅔, crushed linseed ⅓. Make into a porridge and mix hot with skim-milk.

Linseed cake finely ground 7 lb., mixed meal (equal parts wheatmeal, barley, oat, and bean meal) 7 lb., hot water 6 gallons.

Linseed contains about 35 per cent. fat; ground linseed, unless freshly ground, about 28 per cent. fat; linseed cake, about 10 per cent. fat.

Under whichever of the foregoing methods calves may be reared, their ultimate destiny is by no means assured. Those reared under natural conditions will undoubtedly withstand more privations than those reared under artificial methods; but if those reared under either conditions are turned out after weaning to fossick for themselves on coarse or run-out pasture, or, as is sometimes done, turned out to act as "fern-destroyers" on new land, the loss will be greater than had they been dragged up on separated milk or whey, and the survivors turned out to continue their miserable

existence on indigestible and innutritious food. The old Scotch saying, "From hay to heather never," is equally applicable to stock in New Zealand, and especially to weaners. If calves are to be reared as profitable dairy or beef cattle, they must be properly fed from birth, and never allowed to lose their "calf flesh," which, if maintained for the first eighteen months without a set-back, makes cattle-rearing for either dairy or beef purposes a more profitable undertaking.

One factor not generally recognized is the advantage of having calves dipped at or before weaning-time in a *non-poisonous* dip. If they are given a drench at the same time the benefit will be even greater.

HEREDITARY TRANSMISSION.

A REMARKABLE CASE.

The accompanying note and photograph from Mr. A. Hubbard, Inspector of Stock, concern a remarkable case of hereditary transmission. Were it not for my absolute confidence in the reliability of Mr. Hubbard's statements I should feel inclined to doubt the possibility of such a case occurring.—*H. A. Reid, F.R.C.V.S., F.R.S.E., D.V.H.*

The photograph herewith, of a calf born bearing its mother's earmarks, illustrates the phenomenal extent to which characteristics of the parent are sometimes imparted to the young. This calf, which is now six months old, is the property of Mr. John Hodge, of Greytown, and as I saw the animal when it was only ten days old I am able to vouch for the authenticity of the case.—*Archibald T. P. Hubbard.*

IMPROVEMENT OF DAIRY HERDS.

CAN FARMERS CULL INTELLIGENTLY WITHOUT TESTING?

W. M. Singleton.

Many dairymen have every confidence in their ability to handle a dairy herd intelligently without adopting any method of testing. In the past we have given many illustrations of mistakes that have been made by some of our very best dairymen in their attempts to cull without testing their unprofitable cows. The cases cited were individual instances; but even averages indicate the great influence systematic testing may have on the results and, incidentally, on the Dominion's dairy industry.

In three associations the members testing their cows two consecutive years tested during the first season 205 two-year-old heifers. Of these, sixty-eight were culled by the owners after the first season. The 137 two-year-old heifers which were retained were again tested as three-year-olds, and averaged 204 lb. butter-fat. Those heifers which came into the test during the first season's testing as three-year-olds averaged 186 lb. butter-fat, as compared with the 204 lb. butter-fat of those three-year-olds selected by testing. The increase is 18 lb. butter-fat per heifer in favour of selecting on cow-testing association records.

Of the cows in test in these herds, 18 per cent. were two-year-olds. The census for 1911 credits New Zealand with 633,733 cows. Of these, 18 per cent. represent 114,071 two-year-olds. If selecting on test represents 18 lb. fat increase per heifer, and if two-thirds of the heifers tested were retained, the value of the increase would amount to £68,442 in one year. Supposing these milked on an average six seasons, the gain would, on these figures, represent £410,652. The testing of all the two-year-old heifers from which these were selected would have cost perhaps £15,000. This return would equal over 2,600 per cent. on the cash outlay. The labour will be recompensed by the information and interest which the figures afford; and, in any case, the dairyman should not hesitate to expend a little labour where such good investments may be realized. It would appear that the question is not "Can we afford to test?" but rather "Can we afford to milk without testing?"

Of the two-year-olds on test, sixty-eight were culled from 205 before the commencement of the second testing season. This number represents 33 per cent. of the total. The three-year-olds which were culled represent 33 per cent. of the number tested, while the culls from the four-year-olds represent 32 per cent. of those tested. It seems obvious that the previous culling of three- and four-year-

Waihi Beauty I, owned by Mr. J. Deacon, Manaia.

Prior to aborting, and while under semi-official test, she produced in 247 days 14,991·5 lb. milk, containing 574·55 lb. butter-fat. During this time she carried a calf 140 days, and should have calved normally within thirteen months after starting her test. Had the abortion not occurred, she would doubtless have milked the full twelve months.

olds was not done with the best judgment, and that, according to the law of averages, a number of good heifers were culled prior to the owners joining the cow-testing association. That the percentage of three- and four-year-olds culled on test should be the same as that of the two-year-olds surely indicates that previous culling and selection might have been done on better lines.

At the recent dispersal sale of the noted Jersey herd of Mr. C. Day, Pencarrow, Waikato, two fine cows were secured for the Ruakura Farm of Instruction. One was Pencarrow's Princess (2343), calved 15th December, 1911. Her sire was Fancy's Carnation's Fox, and her dam Ethel Lambert (by Sailor Boy). The other cow was Constance (1066), calved 16th December, 1909. Her sire was Viper, and her dam Retford Girl (by Retford Boy). Both cows were bred by Mr. Day.

BACTERIZED PEAT.

PROFESSOR BOTTOMLEY'S DISCOVERY.

A LONDON cable, dated the 30th June, conveyed the information that Professor W. B. Bottomley, the eminent British botanist, produced at King's College a new stimulant to plant-life called bacterized peat, from the use of which, it was said, remarkable results had been obtained. The cablegram further stated that agricultural colleges were making extensive experiments with bacterized peat, and that the Irish Department of Agriculture was using 2 tons of it in connection with the cultivation of potatoes.

Through the courtesy of Mr. Edwin Hall, a member of the Board of Agriculture, a description of Professor Bottomley's system of soil-inoculation, given before the Royal Society of Arts, London, by Mr. Bottomley himself, has been secured for the benefit of readers of the *Journal*. Following is the report of Mr. Bottomley's address in the Journal of the Society :—

THE BACTERIAL TREATMENT OF PEAT.

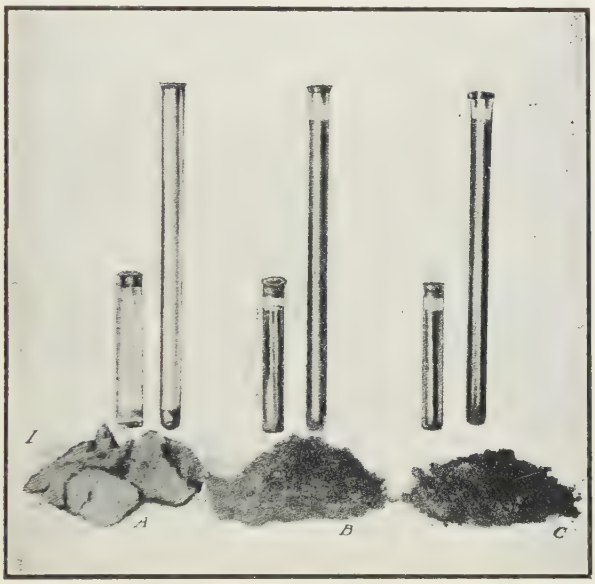
By W. B. BOTTOMLEY, M.A., Ph.D., F.L.S., Professor of Botany and Vegetable Biology, King's College, London.

If the statement be true that "the soil is the basis of national wealth," the problems of soil-fertility and plant-production are not merely of interest to farmers and gardeners, they are of national importance.

Since the days when Adam tilled the earth in "the sweat of his face" down to the present time the question of food-supply has been one of the dominant factors of man's existence. As time goes on and populations increase and their needs become greater this question of food-supply will become more and more acute. Some writers have already given us terrifying pictures of this food famine of the future. But man's necessity is science's opportunity, and the comparatively new science of bio-chemistry is already indicating methods for increasing crop-production which, if utilized, will enable the race to produce all the food material required for many generations to come.

In early times the subjects of soil-fertility and plant-growth were thought to be quite simple. It was held that plants derived all their nourishment from the humus of the soil, and this when exhausted was replenished by manuring with dung and other organic materials.

This "humus" theory was replaced about the middle of last century by Liebig's "mineral plant-food" theory. He stated that plants obtain their carbon from the carbonic acid in the air, and their necessary ash constituents from inorganic salts in the soil. Soil-fertility could be maintained solely by the addition of mineral



The titles of illustrations appear on page 28.

fertilizers. This theory, with certain modifications, is generally accepted at the present time, and is seen stereotyped in the Fertilizers and Feeding Stuffs Act, where nitrogen, phosphates, and potash are the only factors considered in a manure.

But during recent years evidence has been rapidly accumulating that the organic matter of the soil with its myriads of bacterial inhabitants is the most essential factor in soil-fertility.

Organic matter, whether of animal or vegetable origin, when mixed with the soil, undergoes decay—some portions rapidly, others slowly—resulting in the production of the dark material known as "humus." This material provides food and energy for numerous soil bacteria, and is gradually converted by them into substances

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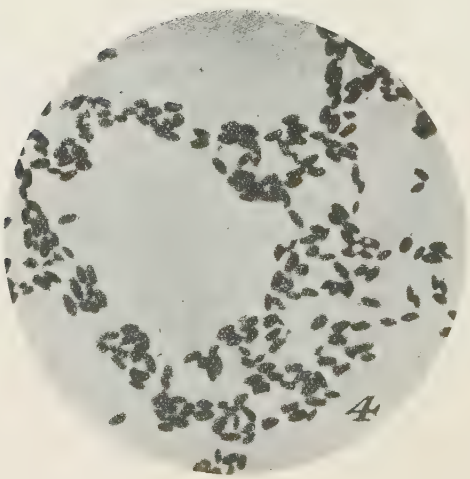
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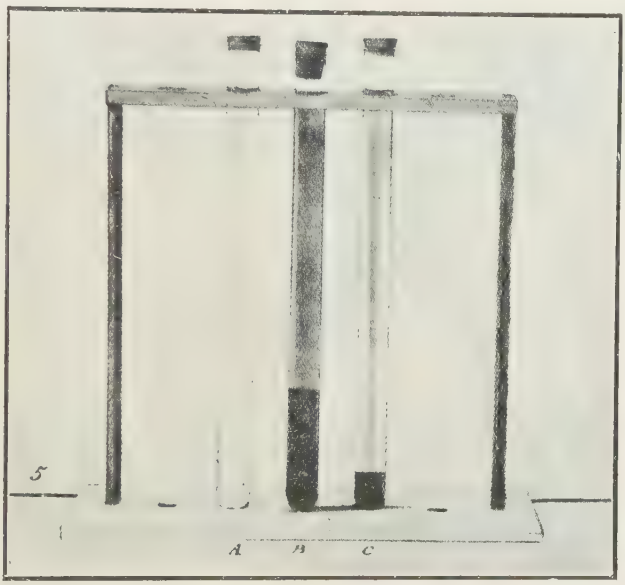
suitable for plant-food.' These bacterial activities not only produce nitrates and other food substances, but they also render the mineral-food constituents of the soil available for plants. Thus a "new humus" theory of soil-fertility is gradually evolving as a result of modern research.

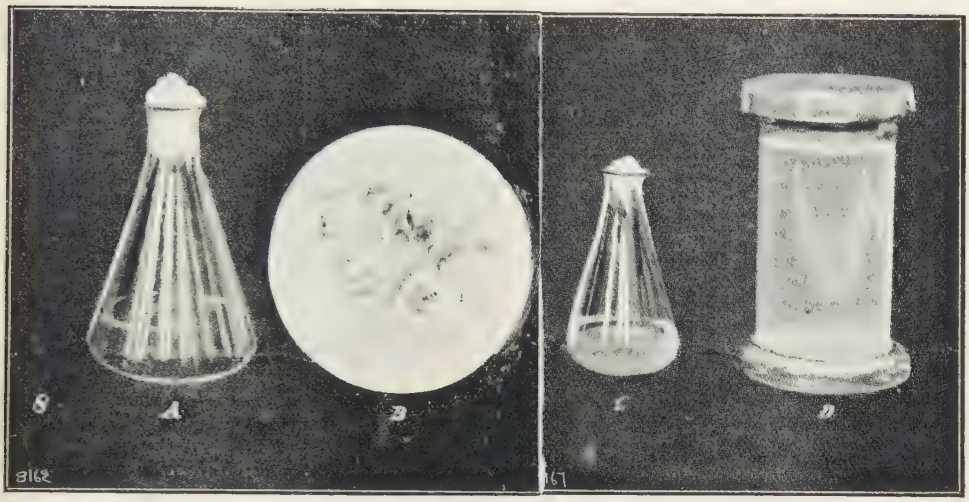
The parts played by the different kinds of bacteria found in the soil have been the subject of much investigation in recent years. Amongst these the nitrogen-fixing bacteria are perhaps the most important, for by their activities they can assimilate free nitrogen and add to the soil an increasing store of this essential element in a combined state.



The great discovery by Hellriegel and Wilfarth in 1886 of the relationship between leguminous plants and the "nodule" bacteria, and the demonstration by Beijerinck in 1888 that the bacteria in these root-nodules can absorb gaseous nitrogen from the soil air and combine it with other elements into nitrogenous food material, was followed in 1900 by Nobbe and Hiltner's preparation of pure cultures of these "nodule" bacteria for soil-inoculation. High hopes were entertained that soil-inoculation for leguminous plants would result in greatly increased crops, and thus solve in part the problem of nitrogenous manuring. Unfortunately, these hopes failed of realization, for, although on certain poor soils inoculation has been attended with good results, it has to be

admitted that on ordinary soils inoculation is useless for increasing the growth of leguminous plants.

In addition to the "nodule" organisms there are other nitrogen-fixing bacteria found in the soil, independent of any host plant. These live in the soil itself, and develop there even when no crop is growing upon it. The most important group of these free nitrogen-fixers is that discovered by Beijerinck in 1901, and named by him "Azotobacter." They are large ovoid forms, aerobic in habit—that is, they live only in the presence of air—and they are widely distributed in all fertile soils. Their power to fix atmospheric nitrogen is more pronounced than that of any of the other nitrogen-fixers, and it has been stated that "Azotobacter, by its relative abundance, indicates what may be termed the natural nitrogen-recuperative power of a soil."


A
B
C
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A
B

Azotobacter can be cultivated quite easily in the laboratory in culture solutions containing sugar and the necessary mineral salts, but no nitrogen compounds; and it can be demonstrated by analysis that considerable quantities of atmospheric nitrogen have been fixed after ten to fifteen days' growth. Here again there was the prospect of utilizing these cultures for soil-inoculation, and thus directly increasing the nitrogen-content of the soil, but in spite of numerous experiments and attempts in this country, Germany, and America only negative results were obtained.

Recognizing the undoubted capacity which Azotobacter possesses to fix appreciable quantities of free nitrogen, it was felt that if

only a suitable medium could be obtained it ought to be possible to introduce the organism into the soil with beneficial results, and it was with this object in view that a series of research experiments were commenced in the Botanical Laboratory, King's College, three years ago.

It was evident from the failures of previous investigators that a liquid medium was useless. The natural home of Azotobacter is not in a liquid but in soil, where in the presence of air it obtains its food and energy from the humus. Heinze, Krzemieniewski, and others had already shown that soluble soil-humates exercise a remarkable stimulating action on the fixation of nitrogen by Azotobacter. Hence the problem was to find a medium rich

in soluble humates. Numerous substances containing humus were tried, but all without success. Finally, experiments were made on peat. Natural peat is rich in humic acid, and it is well known that this humic acid can be converted into soluble humates by the action of alkalies, such as potassium hydrate, sodium hydrate, and ammonia. It was very soon evident, however, that peat treated with these chemical substances was useless for Azotobacter. The organism refused to grow in such a medium. Then, by a more or less happy chance, it was discovered that certain aerobic bacteria possess the power of converting natural peat into a "humated" neutral medium in which Azotobacter flourishes well if the "humating" bacteria are killed off by

sterilization before the culture of Azotobacter is added. Hence the preparation of the treated or bacterized peat consists of three stages—first, the raw peat is moistened with a culture solution of the special "humating" bacteria, and the mass kept at a constant temperature for a week or ten days; during this time the bacteria act on certain organic constituents of the peat, and gradually convert a large amount of the humic acid present into soluble humates: second, the "humating" bacteria, having done their work, are destroyed by sterilizing the peat by live steam: third, the sterilized peat is treated with a mixed culture of nitrogen-fixing organisms—*Azotobacter chroococcum* and *Bacillus radicicola*—and after a few days' incubation at 26° C. is ready for use.

The following table shows the effect of the treatment as proved by analysis. Analyses of a garden soil and other manures are also given for comparison.

	Soluble Humate.	Soluble Nitrogen.	Total Nitrogen.
	Per Cent.	Per Cent.	Per Cent.
Raw peat	0·028	0·214	1·267
Bacterized peat	15·194	2·694	4·310
Garden soil	0·012	0·026	0·427
Fresh stable manure	0·433	0·291	2·533
Well-rotted stable manure	1·460	0·439	2·848
One-year-old peat-moss litter manure ..	1·050	0·826	2·587

Ordinary soil when mixed with bacterized peat shows a striking increase in nitrogen-content if the mixture be kept at the temperature most suitable for the growth of Azotobacter. In order to test how far this increase was due to the nitrogen-fixing organisms introduced in the peat two similar mixtures of garden soil and bacterized peat were made in the proportion of 9 oz. of soil to 1 oz. of peat, the only difference between the mixtures being that the peat in one was sterilized, thus killing off the nitrogen-fixers present. Each mixture was placed in a large bottle, and remained in an incubator for seventeen days at a temperature of 26° C. The contents were then analysed, with the following results :—

		Grm. N. per 100 grms. Soil.
Soil + sterilized bacterized peat	(*a*)	0·717
	(*b*)	0·709
Soil + active bacterized peat	(*a*)	0·792
	(*b*)	0·789

An average gain of 77 mgrms. of N. per 100 grms. of soil.

Another experiment with soil from Rothamsted gave—

		Grm. N. per 100 grms. Soil.
Soil + sterilized bacterized peat	(*a*)	0·367
	(*b*)	0·363
Soil + active bacterized peat	(*a*)	0·421
	(*b*)	0·417

An average gain of 54 mgrms. of N. per 100 grms. of soil.

As there was a possibility that sterilizing the peat before mixing it with the soil might result in a loss of nitrogen in the

form of ammonia, a third test was carried out on a garden soil from Plumstead. An analysis was made of the mixture of active bacterized peat and soil at the commencement of incubation as well as at the end. This gave practically the same amount of nitrogen as the mixture with sterilized peat, thus indicating that the increase is due to the nitrogen-fixing organisms present. The results of analysis were as follows :—

	Grm. N. per 100 grms. Soil.	Average.
Soil + sterilized bacterized peat ..	(*a*) 0·416 (*b*) 0·417	0·417
Soil + active bacterized peat (at commencement)	(*a*) 0·419 (*b*) 0·410	0·415
Soil + active bacterized peat (at end)	(*a*) 0·474 (*b*) 0·476	0·475

An average gain of 60 mgrms. of N. per 100 grms. of soil.

If this increase of nitrogen could have been obtained throughout an acre of soil for a depth of 3 in. it would represent the equivalent of a dressing of 28 cwt. of nitrate of soda per acre, taking nitrate of soda to contain 15·6 per cent. of nitrogen.

This remarkable result has been described as "a new method of intensive culture — an intensive cultivation of the nitrogen-fixing bacteria in the soil—a 'speeding-up' of nitrogen-fixation."

Experiments at King's College on various pot-plants soon demonstrated that bacterized peat, in addition to being an excellent medium for the growth and distribution of nitrogen-fixing bacteria, possessed special manurial properties of its own. In order to obtain a strictly impartial and extended test of the bacterized peat the authorities at Kew Gardens were approached last spring, and they very kindly arranged to make a series of experiments with a wide variety of plants. The plants selected were hippeastrum, begonia, streptosolon, asparagus, salvia, alternanthera, primula, carnation, pelargonium, fuchsia, and abutilon.

Twelve plants of each kind were selected by the curator, Mr. Watson, as being similar in size, age, and health. They were then potted up in series of threes in the following mixtures :—

Series.	Part Bacterized Peat.		Part Loam.		Part Sand.
1	1	+	2	+	½
2	1	+	4	+	1
3	1	+	8	+	2

4 Loam, leaf-mould, and sand (ordinary potting-compost).

The plants were potted up on the 20th April, and within ten days the effect of the peat was evident in increased growth and stronger development of the treated plants. This increase was maintained throughout the extent of the experiment, and in six weeks' time the treated plants were double to three times the size of the untreated ones. One very important fact demonstrated by the Kew experiments was that flower-production and especially root-development are promoted equally with increase of foliage.

At Chelsea Physic Garden a plot of radishes watered once only with an extract of the bacterized peat gave an increase by weight of 54 per cent. over the untreated plot.

Equally striking results were obtained on some experimental plots at Eton School Gardens by Mr. Machin, where the manurial effect of bacterized peat was compared with artificials and farmyard manure. The whole plot was 51 ft. long by 36 ft. wide. The plot was divided across its breadth into three equal portions of 15 ft. each, and a smaller portion of 6 ft. This gave three plots of 60 square yards each, and a small plot of 24 square yards. These plots were treated as follows: Plot 1, complete artificial manure (top-dressing), 4 oz. per square yard; plot 2 (small plot), no manure; plot 3, bacterized peat (top-dressing), 9 oz. per square yard; plot 4, 1 ton farmyard manure (half dug in subsoil and half in top spit).

The rows of plants ran across each of these four plots. As each crop matured careful weights were taken, and are shown in the following table:—

—	Artificials.			No Manure.			Peat.			Dung.		
	No. of Roots.	lb.	oz.	No. of Roots.	lb.	oz.	No. of Roots.	lb.	oz.	No. of Roots.	lb.	oz.
Potatoes	42	25	7	18	8	9	40	42	10	43	32	4
	Average	0	9·7	Average	0	7·6	Average	1	1	Average	0	12
Turnips	14	7	9	6	2	6	14	11	12	13	8	3
	Average	0	8·6	Average	0	6·3	Average	0	12·7	Average	0	10·1
Beet ..	20	16	4	10	3	4·5	20	25	0	20	17	8
	Average	0	13	Average	0	5·25	Average	1	4	Average	0	14
Onions	61	6	2	37	3	10	60	12	10	58	8	8
	Average	0	1·6	Average	0	1·6	Average	0	3·4	Average	0	2·3
Carrots	28	7	8	14	1	4	28	9	0	28	7	1
	Average	0	4·3	Average	0	1·4	Average	0	5·1	Average	0	4

The percentage increase of the produce from the peat-treated plots over those with no manure, artificials, and farm dung is as follows :—

	No Manure.	Artificials.	Farm Dung.
	Per Cent.	Per Cent.	Per Cent.
Potatoes	123	75	41
Turnips	100	47	26
Beet	281	54	43
Onions	110	110	46
Carrots	260	20	28

It will be noticed that in all cases the yields are small. This is accounted for by Mr. Machin in the following notes :—

(1.) Sandy soil over gravel. No manure for nine years, and had been continuously cropped with potatoes, followed by brassica.

(2.) The previous season (1912) crops were a complete failure. Land as nearly exhausted as possible.

(3.) The mixture of artificials used usually gives better results than dung, but owing to the exceptionally dry spring of 1913 the wet farmyard manure had an advantage.

(4.) All the crops were much below the normal, owing to (*a*) starved land, (*b*) exceptionally dry season on a hot, dry soil. Potatoes were all first earlies.

(5.) The land was specially selected for testing food-values on an exhausted soil.

The beneficial effects of bacterized peat as a top-dressing for grass has been noticed by several experimenters. The remarkable results obtained on the Mid-Surrey Golf Course are described as follows by the editor of the *Garden*, writing in *Country Life* on the 1st November, after inspecting the greens in the company of Mr. Lees, the groundsman at Mid-Surrey : "The first to be dressed was a practice green, which, owing to the very hard wear to which it is subjected and the fact that it is on sand, always gives a great deal of trouble, particularly in the autumn. This green was treated on the 28th August, and at that time was in a very worn condition. Now (1st November) it is as perfect as a green could be, the turf being very close and hard and of a particularly healthy colour. Near to this practice green, and also on sand, is an undulating green that Lees assured me has always been a worry to him at this season. This when dressed with the prepared peat a little more than a fortnight ago was very brown in places, but now the brown patches have almost disappeared, and the turf is very healthy and of excellent substance.

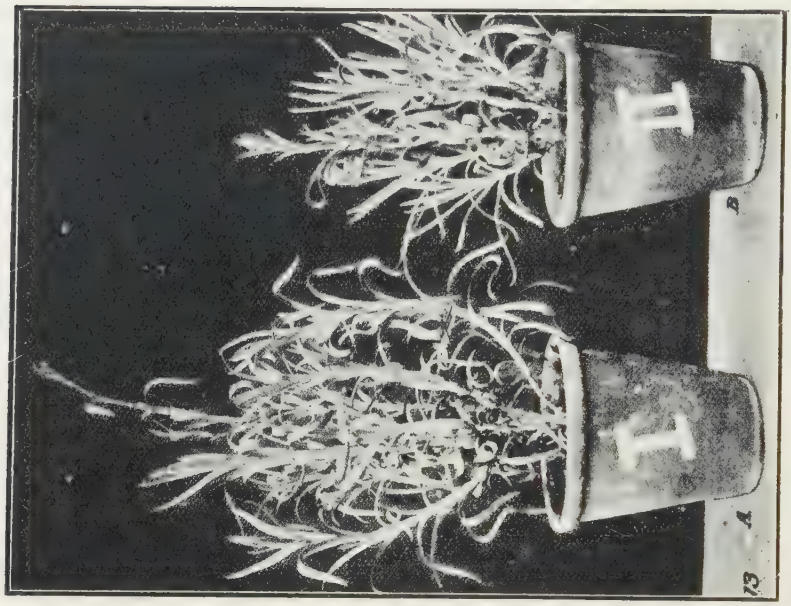


FIG. 13.

FIG. 12.

A third green, also of an undulating character, was treated on Tuesday of last week, and three days later was showing signs of improvement. After experimenting with different quantities to ascertain the proper amount to use—2 oz., 4 oz., 6 oz., 10 oz., and 12 oz. per square yard respectively—Lees has come to the conclusion that 3 oz. per square yard produces the most satisfactory results. This is applied in a pulverized state as a top-dressing, and for the first few days seems to open up the soil and to let the grass through, after which this slight sponginess disappears. Not only have these dressings had a most remarkable effect on the blades of the grasses, but root-growth has also been increased to a very considerable extent."

The question has been raised as to whether the results obtained are due to nitrogen-fixation directly or to a more general manurial effect. Probably both are important.

Recent experiments, however, indicate the probability of the presence of another factor. Mr. Watson, in the Kew experiments, noticed that a small amount of bacterized peat often gave as good results as a heavy dressing. This was most evident when the soil treated contained plenty of available plant-food. In an experiment with richardias, potted up in heavily manured soil, he found that a top-dressing of about half an ounce of peat to a 10 in. pot doubled the weight of the treated plants in a month's time. Dr. Rosenheim, of King's College, obtained equally striking

results on *Primula malacoides* by treating twice only with the water extract of 0·18 of a gramme ($\frac{1}{150}$ oz.) of bacterized peat.

Such effects cannot be due to the small amount of direct food material present in the peat or its extract added to the soil, and it was realized that in the prepared peat there is something which has the effect of stimulating and promoting growth in an extraordinary manner. Numerous experiments now in progress indicate that this "something" is probably similar in nature, as Dr. Rosenheim suggested, to the accessory food bodies recently found to play such an important part in animal growth and nutrition. If this is confirmed it will go far towards explaining the specific action of bacterized peat as a fertilizer.

TITLES OF ILLUSTRATIONS.

1. A. In the taller tube, clear, useless liquid from peat; in the smaller, second extract of same; in front crude peat, insoluble. B. In the taller tube, nearly black liquid extract of bacterized peat. C. In the taller tube, light-brown liquid from old farm-manure; in the smaller, slightly coloured second extract; in front, old farm-manure.

2. One of the nitrogen-fixing bacilli: Specimens of *Bacillus radicicola* (much magnified).

3. One of the nitrogen-fixing bacilli used: *Azotobacter chroococcum* in the nitrogenous slime it makes from the atmosphere (much magnified).

4. Used in conjunction with *Bacillus radicicola* for nitrogen-fixing; *Azotobacter chroococcum*, without their slime.

5. Precipitating-humus: A. Natural peat (no available humus); B. Bacterized peat; C. Matured farm-manure.

6. Differences after six-weeks' growth: A. Grown in loam, leaf-soil, and sand; B. In one part peat, four parts loam and sand; C. In one part peat, eight parts loam and sand.

7. In ordinary soil and in soil treated with bacterized peat: A. Fuchsia grown in ordinary soil; B. Fuchsia grown in treated soil.

8. A. Earth containing the bacteria, and liquid to the top, on which the bacteria float on cultivation and form a scum; B. A glass-covered dish showing colonies of fertilizing-microbes (the lighter, white spots) and places where colonies have been removed for cultivation (the darker breaks); C. Concentrated culture; D. Stock ready for use; each drop contains over ten million bacteria.

9. From soil treated with bacterized peat and from ordinary soil: A. A pelargonium from treated soil; B. One from untreated soil.

10. Two months' growth under different soil-conditions: A. From peat-treated soil; B. From manured soil; C. From unmanured soil.

11. A. Treated peat; B. Washed and cleaned sand; C. A mixture of one part of treated peat to five parts of the sand, described as an ideal growing-soil.

12. Grown in soil treated with bacterized peat and in ordinary soil: A. Salvia grown in treated soil; B. In untreated soil.

13. Grown in soil treated with bacterized peat and in ordinary soil: A. A carnation grown in treated soil; B. In untreated soil.

14. Nitrogen-fixing agent and a result: A. Peat-manure solution (one part, and this used with 200 parts of water); B. Sand to be mixed with the former; C. Tomatoes grown in such a mixture.

The illustrations of this article are from the Illustrated London News.

VISIT OF AGRICULTURAL SCIENTISTS.

FAMOUS MEN IN THE AMERICAN AND BRITISH PARTIES.

In addition to the British and European scientists who are to visit New Zealand to take part in the proceedings of the New Zealand Science Congress, to be held in conjunction with the British Association, at Wellington in September, a number of American scientists will participate. Several members of the American party are men who are pre-eminent in the work of rural progress in the United States. Their presence in the Dominion will therefore be of special interest to New Zealand agriculturists.

Dr. L. H. Bailey, Director of the College of Agriculture of Cornell University, whose clear and voluminous writings of a semi-popular nature are known to all students of agriculture, is one of the party. In this country the Bailey text-books are in general use, while the Bailey encyclopædias of American agriculture and horticulture are regarded as works of reference of high value. Dr. Bailey, who is a noted authority on agricultural education and on the economics of agriculture, was chairman of ex-President Roosevelt's great Country Life Commission.

Dr. C. B. Davenport, Director of the Carnegie Institute of Experimental Evolution, is another noteworthy personage in the agricultural world of America. He is one of the leaders in the new science of genetics. His writings on this subject represent the last word on the available knowledge of this important question. Of special interest are his extensive studies on the breeding of poultry. His visit to New Zealand will be of significance to all interested in the important work of animal and plant improvement. The Corriedale, New Zealand's general-purpose sheep, and the high-type laying-strains of the White Leghorn fowls of this country have no doubt largely influenced Dr. Davenport in deciding to visit this part of the world.

Another member of the American party eminent in the domain of agricultural research is Dr. L. J. Briggs, one of the distinguished company of scientists who has made the United States Department of Agriculture the potent force it is in agricultural advancement. Dr. Briggs is in charge of the bio-physical investigations connected with the Bureau of Plant Industry, and his work

in this connection is elucidating many problems in crop-production. During the past few years he has been specially identified with the American work on the utilization of arid and semi-arid lands. The importance of this problem to New Zealand, especially in the semi-arid districts of the South Island, makes the visit of this scientist of special importance.

A fourth member of the party whose work is directly related to that of the farmer is Dr. W. M. Wheeler, Professor of Economic Entomology in the Agricultural College of Harvard University. He is a distinguished zoologist, and is at the present day one of the leading figures in economic entomology. To this scientist we owe a great deal of our present-day knowledge of the life-history and conduct of many of our farm and garden pests.

As has been already announced in the newspaper Press, the British party of scientists includes two men whose names are intimately associated with the work of British agricultural progress—Dr. A. D. Hall and Professor T. B. Wood, the former being the late Director of the famous Rothamstead Experimental Station, and at present a member of the British Agricultural Development Fund Commission, the latter being the head of the Agricultural School of Cambridge University.

The visit of such a coterie of world-famous agricultural scientists is pregnant of vast possibilities in the work of agricultural advancement in this country. Their investigation of New Zealand agriculture should throw light on many local problems, and be a stimulus to the men who are following in their footsteps in this part of the world.

DETERIORATION OF PASTURES.

AMONG the causes leading to deterioration of pastures in New Zealand, the chief—and one of the greatest mistakes a farmer can make—is undoubtedly continuous overstocking, more so in the case of sheep stock. No pasture, however rich, will stand continuous close grazing by sheep. It is admitted that sheep do not thrive well when the feed is long, and it is a true saying that "a sheep may starve in the midst of abundance"; but there is always a happy medium between the two. Where possible, both cattle and sheep should be kept, the latter invariably following the former; and where sheep only are kept the pastures should receive an occasional spell to permit the recovery of the finer grasses and clovers, which constant close grazing will eventually kill.—*Primrose McConnell.*

THE TILLERING OF WHEAT.

L. J. WILD, M.A., F.G.S., Wanganui College.

THE following experiment was suggested by a statement in Dr. Griffith's "Treatise on Manures" to the effect that treating the seed wheat with a solution of sulphate of ammonia gives an increase in the number of stems produced by the individual plant. The work was carried out on experimental plots of from 10 to 15 square yards in area at the Marlborough High School in the season of 1912–13. The soil, a rather stiff clay, had previously been in potatoes without manures, and no manures were applied to the wheat. The samples, which were provided by the Department of Agriculture, were each divided into two portions, one portion of each variety being sown as a check. Five varieties were treated with a solution of nitrate of ammonia and three with a solution of sulphate of ammonia, the solutions in each case being of about 3-per-cent. strength. The plots were regularly examined to see if any difference was evident between the treated and untreated portions in the rate of or capacity for germination, or in the rate of growth subsequently, but none could be noticed. In general appearance the whole crop of each variety was quite uniform throughout the whole period of growth. When the grain was in ear, however, twenty plants were taken at random from each portion, treated and untreated, of each variety. The total number of stalks produced by each group of twenty plants was counted and divided by 20 to get the average number of stems per plant in each portion. The results are tabulated below.

VARIETIES TREATED WITH SOLUTION OF SULPHATE OF AMMONIA.

Variety.	Number of Stems per Plant on Treated Portion.	Number of Stems per Plant on Untreated Portion.	Average Increase in Number of Stems.	Increase per Cent.
Hunter's White	7·5	6·4	1·1	16·7
King's White	6·5	5·6	0·9	16·0
Bordier	12·4	11·4	1·0	8·8
Totals	26·4	23·4	3·0	..

Average increase per cent., 12·8.

VARIETIES TREATED WITH SOLUTION OF NITRATE OF AMMONIA.

Variety.	Number of Stems per Plant on Treated Portion.	Number of Stems per Plant on Untreated Portion.	Average Increase in Number of Stems.	Increase per Cent.
Red Tuscan	10·5	10·0	0·5	5·0
Solid Straw Tuscan ..	10·1	7·6	2·5	33·0
White Tuscan	8·3	6·7	1·6	23·9
Glynus	7·0	6·3	0·7	11·1
Pearl	8·0	5·8	2·2	37·9
Totals	43·9	36·4	7·5	..

Average increase per cent., 20·6.

Owing to the ravages of small birds during the summer holidays there was no crop worth harvesting, and consequently one can only speculate as to the effect the greater number of stalks might have on the yield of grain. The point certainly seems worth investigating on a larger scale, and this account is sent forward in the nature of a suggestion to any who may have the opportunity of repeating the experiment under such conditions as will allow of an estimation of the yield of grain. It is noteworthy, also, that nitrate of ammonia seems to be more effective than sulphate of ammonia in producing the desired result.

PRE-COOLING OF FRUIT:

ITS IMPORTANCE BEING REALIZED BY AMERICAN GROWERS.

E. CLIFTON.

THE extent of the attention the American fruit-farmer extends to the condition of his product is shown by the activity being displayed in the erection of up-to-date mechanical refrigeration plants in fruitgrowing districts for pre-cooling purposes. It is recognized that to ensure the delivery of fruit in an attractive condition a matter of first importance is that it should be prepared for transportation by thorough pre-cooling. Local experience shows that the insulated railway-car, with the full capacity of ice, fails to maintain the required temperature-control unless fruit has undergone the process of pre-cooling.

To assure that fruit may reach the market and the consumer in the best condition, as well as to avoid claims for deterioration,

pre-cooling is now regarded as imperative. It is quite recognized that in California the temperature is higher than in New Zealand, and that the railage here is over greater distance, but the recognition here of the necessity of absolute control of the temperature will at least demonstrate to New Zealand fruit-farmers the need of the adoption of all possible precaution to assure the transportation and delivery in the most attractive condition of a product so susceptive of deterioration by exposure to heat as fruit. It is necessary to point out, however, that the carriage of fruit at a safe temperature is essential from the shipping-point to its destination.

ESTABLISHING A FRUIT-FARM.

ESSENTIAL REQUIREMENTS.

W. A. Boucher.

The planning of a fruit-farm is a subject to which too little attention is given, especially where the area being planted is on a comparatively small scale. The ideal fruit section should consist of from 25 to 30 acres. But only from 10 to 15 acres of this should be planted in fruit-trees, according to the means and requirements of the owner. Sufficient land will then be available to render the section to a large extent self-supporting. Apart from the orchard, land is required for house and garden, paddocks for the team to work the orchard, cows to provide milk and butter, and for poultry and a vegetable-garden. Living in the country is much cheaper than living in the town, but only when the advantages which the country presents are availed of. The fruit-farmer should therefore aim to make the most of the opportunities presented him for reducing the cost of living and for economic production. It is only then he will reap the fullest benefit from his enterprise. Instances have occurred where the areas acquired have been altogether too small, this necessitating the planting of practically the whole of the area in fruit-trees. The natural result is that the settler has to procure teams for the working of his orchard, and is compelled to purchase the main necessaries of life, which he could readily produce on a few spare acres by the employment of his energy at odd times.

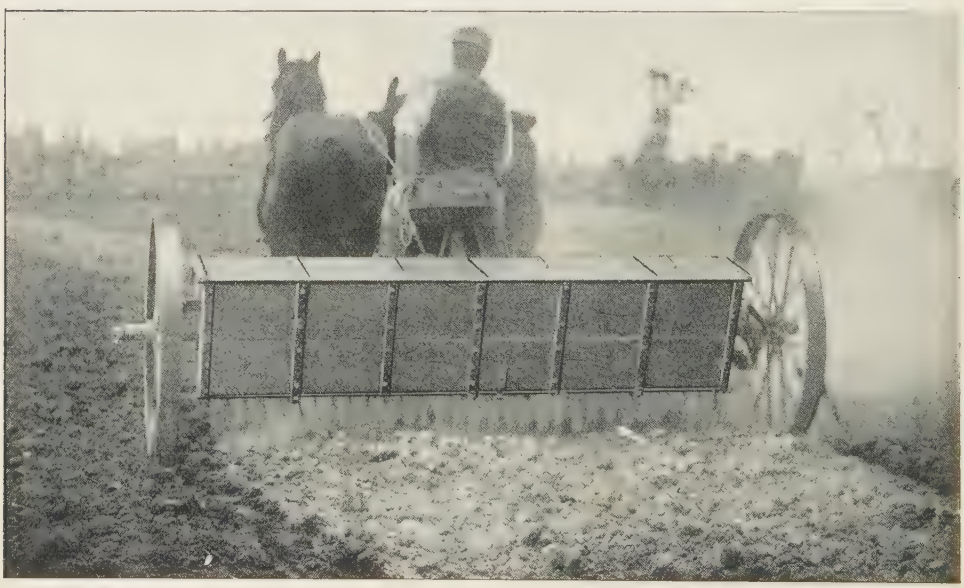
Given the necessary area it will be possible, and certainly advisable, to have a few hives of bees. Not only will a business embracing all these activities make for satisfactory work, but it

is only under such conditions that fruitgrowing will prove the really profitable business it should be. If the whole area be planted to fruit-trees the expense of employing outside teams and having to purchase all food-supplies will eat up a very large percentage of the profits realized from the fruit.

Again, every business man looks forward to banking a certain amount of money as the result of each year's work, not only as an insurance against old age and possible accidents, but as a sinking fund to be drawn upon in the event of unprofitable seasons. The same principle should guide the fruitgrower. The hand-to-mouth existence will never make a contented and progressive settler; and it is only where the small fruit-farm is self-contained as far as is practically possible that the settler will be in the happy position of making a good living and having something in reserve for future eventualities.

MECHANICAL DISTRIBUTION OF LIME.

A NEW machine for the sowing of lime and fertilizers has been placed on the market by local manufacturers, Messrs. Armour and Johnston (Limited), of Invercargill. The machine, illustrated below, is said to be very simple in construction, to be strongly built, and to be thoroughly effective.



A CALIFORNIAN FRUIT COLONY:

THE DISTRICT OF LODI.

E. Clifton.

An opportunity was recently afforded me of visiting one of the most interesting portions of California, and of meeting there many fruit-farmers who had foregathered for the purpose of discussing matters in connection with their industry. The town of Lodi is the commercial centre of the district. It is situated east of San Francisco, some hundred miles distant, and is on the Southern Pacific Railway, the district being also traversed by the lines of the Central Californian Traction Company. Lodi has a population of about 3,500, and yet a few years ago it was unknown as a town. The district was then one of large holdings where general farming and big interests in cattle were the dominant features. The country has been rapidly transformed, and it is now in vineyard, orchard, olive-grove, and alfalfa (lucerne). The bungalow residences of the farmers are to be seen everywhere, and every homestead is to be admired. They are approached by roads bordered with shade trees, and about them there is a general air of progress and of well-being. The district is attractive, and people in the little town are prosperous. The sole powers—the magicians—are sunshine and water. With the abundant sunshine of California and with the application of water by means of irrigation every plant flourishes. The vigour of the grape-vines and fruit-trees and the response of the lucerne are ample testimony to the power of sun and water, so well supplemented by the skill and industry of the farmer. The country is level, and the soil is fertile and open in texture. These advantages are well availed of; indeed, under such a combination of favouring circumstances there is every encouragement to the enterprising fruit-farmer. A feature of the district is the entire absence of fences and the unprotected fruit-trees, which seem strange to one accustomed to the enclosed farms of New Zealand.

The cultivation is perfect. One passes for miles through a succession of vineyard and orchard, all planted with strict regularity and cultivated as well-cared-for gardens. Here is the realization of the up-to-date fruit-farm, thoroughly and successfully operated. The fruit chiefly cultivated is the table-grape, and of this the special variety is Flame Tokay. There appears to be an increasing area

being laid out in almonds, while the prune is extensively planted. The olive is also in favour, while peaches are being produced on a fair scale. Actually the fruit of almost all countries can be produced here. While this is so, experience has shown that certain fruits, and even certain varieties of these fruits, are adapted to definite areas. So the production of a grape such as Flame Tokay is specially cultivated, and it is asked for in distant markets as the "Lodi" grape. There have been produced here up to 7 tons of table-grapes to the acre, while the accepted market price is about £4 per ton. Professor Hunt, Dean of the University of California, has collected data in order to furnish the probable and possible yields of the principal grapes of California. For table-grapes a safe estimate is 5 tons, but a competent man may expect to reach 7 tons. At Lodi this yield has been secured.

The price of land naturally varies very considerably. A vineyard may be worth £120 per acre, and even more. An established olive-grove is estimated at even higher rates. The price of £200 an acre for such a property was spoken of, but no actual sale was mentioned.

Lodi is a well-laid-out and attractive town. The railway services are convenient. Apart from the Southern Pacific, a frequent service between Stockton, of thirty thousand inhabitants, and Sacramento, of eighty thousand, is provided by the Central Traction Company. It is one of the features of California that there are railways everywhere. There are main lines with their heavy trains; other trains consist of one or two carriages, and pick up freight anywhere; and then, and not the least important, are the electric traction roads. These are numerous, and the tractors, with their one to three carriages, outpace the regular trains. To the stranger it is a difficulty that in no one time-table are all the trains coming to a town shown. Each transportation company shows most completely its own system and lines of communication. When travelling to one's destination it will be found that the train is crossing other lines or running almost parallel with others. On inquiry it will probably be found that from one town there are two main lines, a steamer, and an electric train going in the direction to which one desires to proceed. This is a great point of difference between a country where the State owns the whole railway system, as in New Zealand, and a country in which transportation is the vortex of the keenest of all competition. It is not in the least my intention to compare ownership of transportation interests by the State or by private and competing institutions, but merely to express the difficulty where facilities for travel are provided but are difficult to discover.

To return to Lodi. As this country is devoted to fruitgrowing general farming is not on a large scale. The population is fairly

numerous. Education is imperatively demanded; it is royally provided and loyally supported. The Lodi High School is a magnificent building. It was erected at a cost of £30,000. Pupils graduate directly from this institution to the University of California. Attached to the High School are some 50 acres, where all operations of the farm are undertaken. Actually it is an advanced school in intimate association with the vocational training of the farmer. The gentleman by whom I was accompanied through the district emphasized the contention that the young people should be given every opportunity to secure the highest education and the means of obtaining the most prominent positions in the Union. He realized, however, the still greater importance of vocational training. He said, "It is the man on the land who is the foundation of our country, and we shall start our young people with the greatest of advantages if we give them a correct knowledge of the land and what to do with it to attain success." He expressed the sentiment of the American people—education, and the practical application of education. This is in being at the High School of Lodi.

SEMI-OFFICIAL TESTING.

W. M. Singleton.

During the past few months few cows have finally qualified for certificate for the year's performance. This portion of the year may fittingly be termed the "off season," although it does not follow that the future may not evidence the issue of more of these certificates during the late summer and autumn months. At first it was considered that purebred cows should calve in early spring to produce the best records, but experience has shown that good records may be made with any calving-date, provided the requisite feed and attention be supplied.

The figures given below change the position of only one of the previous leaders of the Holstein-Friesian classes. Mr. G. Aitchison's Gladys II was heretofore the leader of the three-year-old class, and is now displaced by her sister Dutch Girl, belonging to the same owner. Dutch Girl's record of 644·54 lb. fat is certainly very creditable.

The records of Jerseys which we published previously gave the premier position not only of the two-year-old class, but of all Jerseys, to Lady of Collingwood, with 524·29 lb. butter-fat. While this cow still remains at the head of her class, she has been displaced from the premier position of her breed by the thirteen-

year-old cow Frisk with 542·28 lb. fat. In the mature class there is also a change of leaders, Frisk replacing Mamy I (514·92 lb. fat) as the best mature cow to date. In the remaining Jersey classes the leaders are not changed by this list.

Name of Cow.	Name and Address of Owner.	Age at Starting Test.	Yield for Season.		
			Days.	Milk.	Fat.
	HOLSTEINS.				
	Two-year-old Class.	Yrs. dys.		lb.	lb.
Brookland's Pride ..	Newton King, New Plymouth	2 357	365	12614·50	399·21
Riverside Violet ..	C. Hopping, Feilding ..	2 310	297	11762·20	398·98
Pledge Pontiac de Kol	J. H. Parkinson, Opotiki	2 221	338	9086·20	300·02
Snowdrop ..	W. Remnant, Palmerston North	2 78	361	7290·00	255·31
	Three-year-old Class.				
Dutch Girl ..	George Aitchison, Kaitangata	3 349	363	18332·25	644·54
Longbeach Ideal ..	C. Hopping, Feilding ..	3 200	365	16473·20	633·85
Pride II of Brundee	Weraroa Experimental Farm	3 250	359	13520·60	421·02
Johanna Fayne Lady	James Hart, Raumati	3 151	304	9203·00	325·95
	Mature Class.				
Daisy	George Aitchison, Kaitangata	5 270	365	19994·25	659·30
Waihi Beauty ..	J. Deacon, Manaia ..	7 307	247	14991·50	574·55
Lenore	Weraroa Experimental Farm	Aged	365	14746·40	481·29
Glendowie Dorcas ..	C. C. Buckland, Cambridge	,,	365	15932·85	459·22
Glendowie Amelia ..	Ditto	,,	365	10981·10	428·49
Daisy of Noura ..	W. Potter, Mangere ..	,,	365	12201·70	418·78
	JERSEYS.				
	Two-year-old Class.				
Majesty's Eileen ..	A. Moreland, Papatoetoe	2 71	324	6627·00	351·82
Zeila	W. V. Harkness, Tariki	1 305	302	5638·90	305·95
	Three-year-old Class.				
Belvedere Thistle ..	E. Eagle, jun., Belvedere	3 347	276	8444·00	373·31
Augustine ..	W. V. Harkness, Tariki	3 42	255	5863·70	321·59
	Four-year-old Class.				
Cowslip VIII ..	E. Griffiths, New Plymouth	4 14	352	7665·50	427·69
	Mature Class.				
Frisk	C. G. C. Dermer, Waipiko	13 338	364	10389·00	542·28
Roses Sweet ..	F. E. Hellyer, Dunedin	6 168	224	8963·80	472·38
Golden Slipper ..	A. Moreland, Papatoetoe	5 330	346	7588·75	440·93
Titanite	A. E. Wilkinson, Pukekohe	6 131	355	8397·30	439·82

FEEDING-VALUE OF PASTURES.

EXPERIMENT TO DETERMINE THE INFLUENCE OF MANURES.

Primrose McConnell.

An experiment to determine the influence of manures on the feeding-value of pastures was instituted at the Ruakura Farm of Instruction in June of 1912. The result of the first year's experience was recorded in the *Journal* of July, 1913. In this it was pointed out that it is not an experiment in regard to the renovation of worn-out pastures, but rather one to determine the length of time required to deplete a previously well-treated soil of its fertility to an appreciable extent, and to ascertain the advantage gained by top-dressing such soil.

There are four plots in all, one being unmanured and the others top-dressed with basic superphosphate, basic slag, and superphosphate respectively. The soil over all the plots is fairly even in quality, and the "No manure" plot occupies the central position. Each plot measures 2½ acres, and the sheep were weighed monthly, or as near that as the weather-conditions permitted.

When it is taken into consideration that only a few years ago this land was almost despised, the fact that each acre of the top-dressed plots has carried, for twelve consecutive months, an average of eleven wethers (several lots of which were turned off fat) is almost incredible.

During the past eight months each acre over the whole field has carried an average of thirteen sheep, and although the "No manure" plot has carried almost as heavy a stock as the top-dressed, the beneficial effect of the manuring is now very apparent. In November and December each plot of 2½ acres carried forty wethers, and made an average live-weight gain of 1,000 lb.

The highest live-weight gains for one month were recorded for September—namely, 740 lb. per plot; and the lowest in June—18 lb.

The results of the first year showed in each case a loss by manuring, but for the year just ended each top-dressed plot has yielded a profit after allowing for the cost of fertilizers.

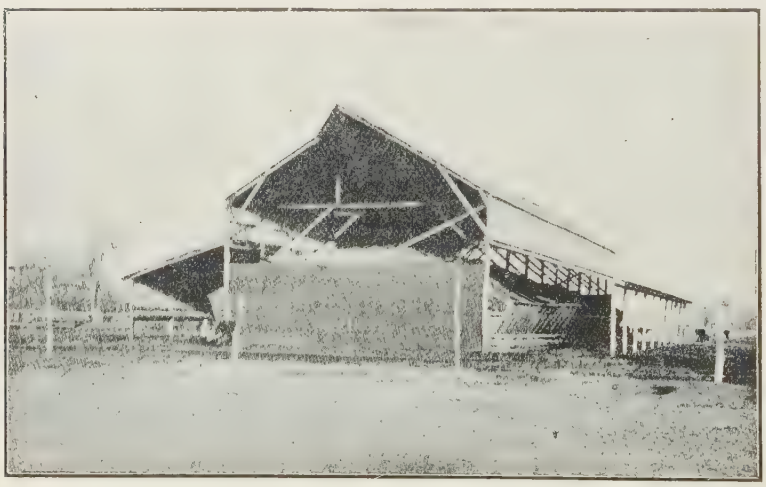
Although basic superphosphate has, so far, given the smallest financial gain, no definite conclusion can be drawn until the experiment has been carried out for several years.

The following table shows the results :—

Plot.	Fertilizers, applied 1912.	Cost per Acre.	Total Financial Gain per Acre on the Basis of Two-thirds of the Live-weight Gain at 3½d. per Pound.	Gain by Manuring per Acre.	Number of Sheep carried per Acre.
		£ s. d.	£ s. d.	£ s. d.	
1	Basic superphosphate, 5 cwt.	1 4 6	9 8 1	0 5 6	11
2	Basic slag, 5 cwt. ..	1 3 6	10 11 7	1 10 2	11
3	No manure	..	7 17 11	..	10·3
4	Superphosphate, 5 cwt. ..	1 4 0	10 10 7	1 8 8	11

LUCERNE-HAY BARN AND FEED-SHED.

THE accompanying photograph illustrates a lucerne-hay barn and feed-shed in use in Kansas, U.S.A. This plan would be improved by boarding up the side or end catching the prevailing wind of



the locality. The idea should appeal to the dairy-farmer or grazier whose fields have neither artificial nor natural shelter. The illustration is from a bulletin issued by the Kansas Experiment Station.

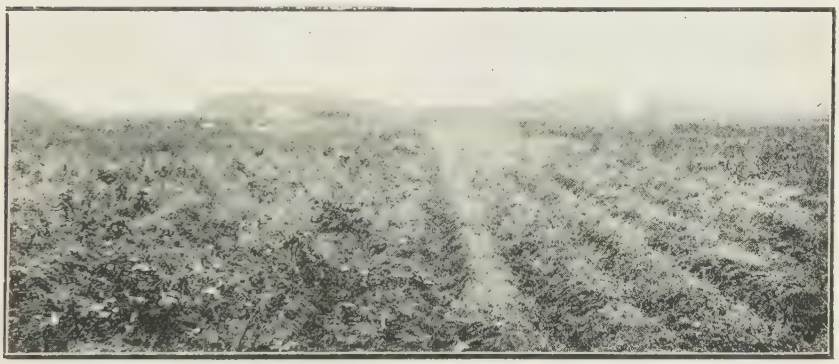
POTATO-BLIGHT CONTROL.

A CANTERBURY EXPERIENCE.

H. E. McGowan.

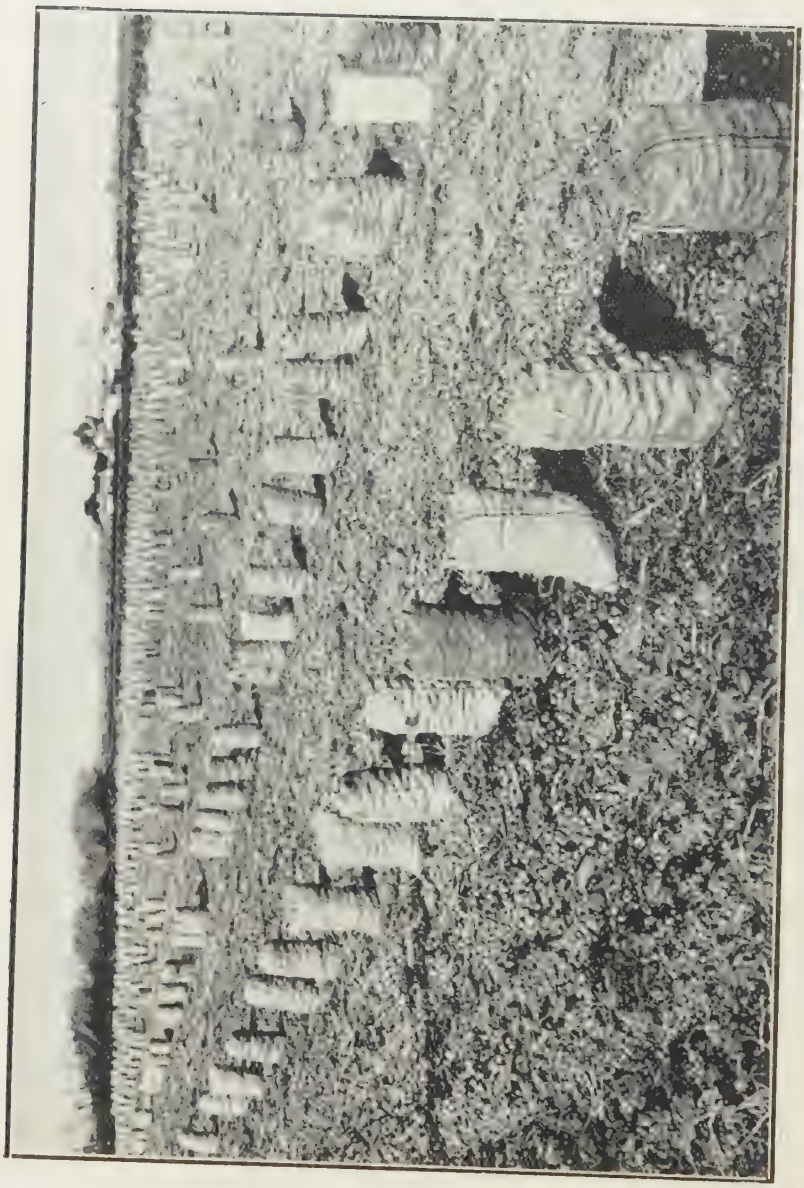
The accompanying photographs illustrate facts which should prove interesting to potato-growers in general.

No. 1 photo shows a 20-acre paddock of Up-to-Date potatoes which were sprayed three times with the 4-4-40 Bordeaux mixture, the strength being increased a quarter at each spraying. In this photograph five rows are shown which were not sprayed at all. The crop was fairly affected with Irish blight before we could get to work with the sprayer, on account of heavy rains. After the



A 20-acre Field of Up-to-Date Potatoes, the Rows on the Right being unsprayed.

second spraying it was noticed that the progress of the blight was arrested, and after the third spraying its progress was stopped altogether, though by this time the haulms of the five unsprayed rows were quite dead and the balance of the field remained green fully five weeks longer. The result at digging was 2 tons 10 cwt. per acre from the unsprayed lot, all practically seed size, and a good few badly blighted; of the sprayed portion, 6 tons 15 cwt. per acre, of which a fair proportion were table size, and very few showing any signs of blight. The difference in favour of spraying was most striking, considering the field was badly stricken with blight before spraying commenced. I have no doubt that if we had been able to commence the spraying a fortnight earlier the yield would have been nearly 20 tons per acre.



A 30-ACRE FIELD OF GAMEKEEPER POTATOES, SPRAYED THREE TIMES.

The Hoover Potato-digger.

Photo No. 2 shows a 30-acre paddock of Gamekeeper potatoes adjoining the paddock of Up-to-Date already referred to. These were sprayed three times with the same mixture, commencing before there were any signs of blight. The result at digging was 20 tons per acre of fine, clean, shapely tubers, whilst a small check plot in the middle of this field which was left unsprayed only yielded about 9 tons per acre, mostly seed size.

Photo No. 3 shows the Hoover digger and pickers at work in the Gamekeeper paddock. Note how well the digger cultivates the land in digging.

WORLD'S RECORD PRODUCTION OF BUTTER-FAT.

The world's record production of butter-fat for twelve months has again been beaten, this time by an American Guernsey. According to the report of her performance, published in *Hoard's Dairyman*, she gave in 365 days 19,639·50 lb. milk, which contained 1,059·59 lb. butter-fat. The previous world's record—1,058·34 lb. for the 365 days—was produced by Bannostine Belle de Kol, an American Holstein. The world's champion, May Rilma, put up her performance under the supervision of the American Guernsey Cattle Club, while it was officially supervised by representatives of the Pennsylvania Agricultural Experiment Station, and was checked by numerous similar institutions in other States and by representatives of the Dairy Division of the United States Department of Agriculture. May Rilma is kept in a box stall, is milked three times a day—4 a.m., 12 noon, and 8 p.m.—and is fed 18 lb. daily of the following mixture: 250 lb. bran, 100 lb. gluten, 50 lb. cotton-seed meal, 50 lb. oatmeal, 50 lb. hominy, as well as 3 lb. beet-pulp and 3 lb. molasses; while she had alfalfa hay, clover hay, and ensilage all she requires. Towards the latter end of the period she was ıed 16 lb. of carrots daily.

An American Guernsey cow established a world's record in 1905, producing in 365 days 857·15 lb. of fat. In 1907 her record was broken by an American Holstein, Colantha 4th's Johanna, which gave in the 365 days 998·26 lb. of fat. This record was exceeded, however, in 1911 by that of another American Holstein, Pontiak Cloth Ilde de Kol II, which produced 1,017·3 lb. of fat in the 365 days. The following year came Bannostine Belle de Kol's sensational record, which has been lowered by the barest margin by a little Guernsey. As to the cost of the food required to produce the new record, nothing is yet available.

MANUFACTURE OF WINE.

USE OF JUICE OF FRUIT OTHER THAN GRAPES.

S. F. ANDERSON.

ALL wine made from fruit-juices is brought about by the conversion of the saccharine matter that is in them naturally, or that may be added to them in the form of the best cane-sugar, by vinous fermentation. Compared with well-ripened grapes this is very low, as the following table by Fresenuis will show :—

Saccharine contained in—	By Weight.
Plums	2·1 per cent.
Greengages	3·1 ,,
Raspberries	4·0 ,,
Huckleberries	5·8 ,,
Currants	6·1 ,,
Damsons	6·2 ,,
Gooseberries	7·1 ,,
Pears	7·4 ,,
Apples	8·4 ,,
Cherries (sour)	8·8 ,,
Cherries (green)	10·8 ,,

The saccharine contained in ripe grapes in the North Island is from 18 to 24 per cent.

The percentage given in the foregoing table will, of course, vary —for instance, if the fruit is very ripe. Gravenstein and Irish Peach apples will exceed 8·4 in January. To make cider, apples are mellowed by keeping for a time. To do this, clean straw or hay is spread under the trees so as to break their fall, and they are then allowed to mature there. The average amount of juice in apples is about 73 per cent., the saccharine 7 to 11 per cent., and the acidity from 4 to 6 per cent.

In the case of grapes, apples, and pears water is not usually added. In nearly all the other fruits water is added. This is necessary because of the pulpy nature of the crushed fruit, and also to lower the acidity. It is obvious that if an equal quantity of water is added the saccharine and acidity will be reduced to half. Taking the case of gooseberries, the percentage of saccharine in the fruit is 7·1. That means that in 100 lb. or 10 gallons of the crushed fruit there would be just over 7 lb. of natural sugar.

Then if an equal quantity of water is added we have only $3\frac{1}{2}$ lb. to the 100 lb.

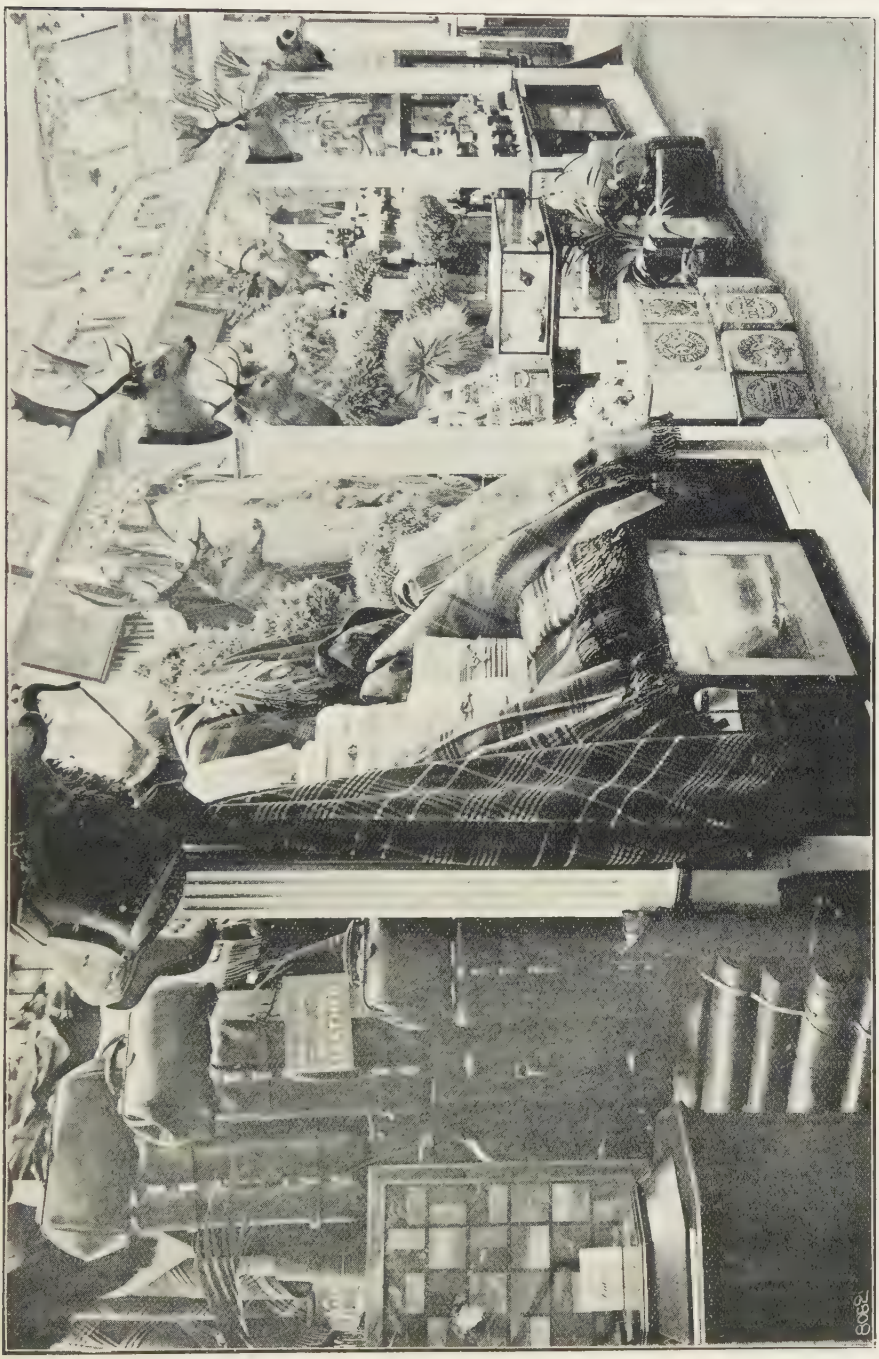
To economize the making of the wine it is necessary to use a saccharometer. The one in use among the grape-wine makers is Guyot's glucometer. It can be obtained from Messrs. G. W. Wilton and Co., of Auckland and Wellington. The directions for its use are supplied with it. Strain a portion of the juice and put it into the test-glass that accompanies the instrument and float the glucometer in it. It will then show on the yellow scale the amount of saccharine it contains. Suppose that it shows $3\frac{1}{2}$ and you are making 10 gallons of sweet wine and it takes 4 lb. of sugar to the gallon, it will require $40 - 3\frac{1}{2} = 36\frac{1}{2}$ lb. of sugar. Having decided upon the quantity of sugar, which is arrived at by measuring the liquid, dissolve the sugar in a portion of the liquid in an ordinary copper boiler which has been thoroughly cleaned beforehand. The heating should be carefully done. It must not come to boiling—160° to 170° F. is high enough. Should it be inclined to go higher add a little of the cold juice. When all the sugar is dissolved pour all together into the cask in which it is to ferment. The temperature favourable to fermentation is from about 65° to 70° F. The juice and the wine, when made, should not come into contact with iron vessels; only wood or earthenware and copper should be used.

The fruit should be crushed through a half-inch sieve into a tub and fermented, with pulp in it or strained clear of the pulp. To get the full flavour of the fruit, fermentation in the skins and pulp is the better way. After fermentation has ceased the clearest part may be decanted off into a cask. The lees or thick portion can be put into a bag made of two thicknesses of scrim and pressed by some means to get the balance of wine from it, and added to the general bulk. Fermentation may last some weeks. As the violent fermentation decreases a small bag of clean-washed sand about 6 in. square may be placed on the bung-hole. This keeps the air out and allows the carbonic gas to escape.

Great cleanliness must be observed in all stages of the work. The froth should be wiped away and the sides washed clean from time to time in order to prevent this from turning sour and communicating with the wine, as this might turn it to vinegar.

On dissolving the sugar—adding this to the bulk of the juice and stirring it well—it should show on the glucometer 30 to 35. This naturally makes a strong wine, which will keep well and improve by age.

Keep in a cool place for six months at least. It can then be bottled off. The cask containing the wine should be kept quite full and bunged tight.



New Zealand's Display at Selfridge's Colonial Produce Exhibition, London.

THE PANAMA EXPOSITION.

DISPLAY OF NEW ZEALAND WOOL.

M. O'Brien.

An endeavour is to be made at the Panama Pacific Universal Exposition to adequately advertise the wool-growing interests of the Dominion, and thereby bring before the manufacturers of this now free-wool country the high-grade character of New Zealand wools. In addition to the exhibiting of special fleeces in the New Zealand Pavilion, it is desired that New Zealand should occupy its rightful place as one of the premier wool-producing countries of the world in the special palace to be devoted to this product. Wool-growers throughout the Dominion have been approached through the provincial wool-brokers' associations for typical exhibits of the best wools produced in different districts. The president of the New Zealand Wool-brokers' Association, Mr. C. S. Bennett, when approached on this subject, was most enthusiastic, and suggested the carrying-out of the whole scheme through the provincial wool-brokers' associations, pointing out that the wool-brokers of the Dominion were thoroughly well acquainted with the quality of the clips in their respective districts, and were therefore in a position to secure the most desired types of wool.

Each competitive parcel should consist of a half or a full bale of each variety. Particulars regarding the get-up of the wool, marking, addressing, and despatch of bales will be supplied after the entries are received. It should be noted that the fleeces which certain growers have already been asked by the Department of Agriculture to supply are for exhibition purposes only in the New Zealand Pavilion, and will not be available for competition.

The Government offers to growers free transport of exhibits by rail, the Union Steamship Company will convey the wool free of cost to the Exposition, and there will be no charge for exhibition space. The only cost to competitors may be some small charge for providing staging or platforms.

At the close of the Exposition, which will be open from the 20th February to the 4th December, 1915, the Government will sell the exhibits to the best advantage, thereby enabling owners to test

the suitability of their products for the American markets, or will dispose of the exhibit in any other way that may be desired. Next season's wool will be required, and it should leave New Zealand by December or January steamers.

Any grower who has not received a circular setting forth the conditions under which wool will be received for competition may obtain a copy on application to Mr. M. O'Brien, Secretary, New Zealand Executive Committee, Panama Exposition, P.O. Box 270, Wellington.

TWO CROPS OF GRAIN IN A SEASON.

SATISFACTORY TRIAL OF AN EARLY-MATURING MAIZE.

W. C. BERRIDGE.

Two years ago the Department procured from America a couple of cobs of maize that matured their grain although not sown until Christmas. The grain was carefully harvested and saved for experiment at the Tauranga Experimental Farm this season.

In May, 1913, five varieties of oats were sown to test their rust-resistance, and as soon as the grain began to harden the birds attacked them, being the first to ripen in the vicinity. These oats were cut in December, 1913, and the land ploughed; 3 cwt. of superphosphate was sown to the acre and harrowed in. The land was then marked out in lines 3 ft. apart each way, and five seeds of Minnesota No. 13 maize was sown at the intersection of the lines on the 14th December. After the plants were 3 in. high they were scarified with a one-horse Planet Jr. cultivator, and cultivated at intervals of ten to fourteen days until 2 ft. high. When about 6 in. high, where all the seeds had grown, they were trimmed out to three plants, and on the 5th May, 1914, the corn was harvested, although some of it was fit to pick two or three weeks earlier. Some of the earliest cobs to ripen are being kept separate for further trial next season, to ascertain what difference there will be between these very-early-ripening cobs and the later-ripening cobs.

While not advocating the general planting of this variety of maize in maize-growing districts, still there are occasions where an early variety would be useful, such as filling gaps and misses in maize-fields where the seed had failed to grow or had been killed

by insects or birds. Occasionally it would be useful or profitable to grow it as a second crop after a straw crop in districts not subject to early autumn frosts, or it might be grown in districts that hitherto have been considered unsuitable for maize-growing. In the United States of America it has extended the maize belt over two hundred miles north of what they formerly considered the limit of maize-growing. If a bushel of white-lupin seed were sown to the acre before the last scarifying of the maize, this would help to maintain the fertility of the soil and supply some of the requisite nitrates, besides adding to the soil more humus.

Several early varieties of maize were tried alongside the Minnesota No. 13, but the latter proved to be much the earliest and the only variety that would mature early enough to use for a second crop the same season.

A couple of sacks of seed maize of this early-maturing variety are now on hand.

ELECTRICITY:

ITS INFLUENCE ON THE PRODUCTION OF POULTRY AND EGGS.

At the end of last season a statement was cabled from London that the English breeder of poultry, Mr. William Cook, had increased the egg-output of six thousand Orpingtons by 30 to 40 per cent. by means of electrically lighted houses, and that the growth of young chicks was accelerated in winter by one-third through the same medium. The electric light was used in the morning and evening, thus artificially lengthening the hen's day.

In order that New Zealand poultrymen might be possessed of the fullest information regarding this electrical treatment, the Department asked the Veterinary Officer of the New Zealand Government in London to visit the scene of the experiment and report fully thereon. The officer in question, Mr. Alexander Crabb, F.R.C.V.S., has duly reported on his investigations. Under date of London, 11th December, 1913, he quoted the following extract from a letter received by him from Messrs. W. H. Cook (Limited), Orpington :—

"At the Ideal Home Exhibition at Olympia pullets that were exposed to the electric light up to about 10 o'clock at night laid

almost double the number of eggs to those that were shut up at 5 o'clock in the evening. The idea of electric light for young chickens is simply that they are able to feed early in the morning with the aid of the light, and also later at night."

Under date of London, 12th February, Mr. Crabb wrote:—

"I have this week visited Messrs. W. H. Cook's premises at Orpington. Up to the present time no statistics have been published, as Mr. Cook has decided to wait until he can give records for a few successive years; but I will keep the matter in mind and forward you any such statistics when issued.

"The use of electric light in houses used for the rearing of young chickens has been adopted during the last two years, and is stated to be an unqualified success. Its use commences in the early spring, when there is natural daylight from 6 a.m. to 6 p.m., and then the electric light is used from about 6 p.m. to 10 p.m., thus lengthening the chicken's day by about four hours. The house used is in the form of a warm brooder, heated with the ordinary hot-water pipes. The chickens are placed here from the incubator when one day old, and, on account of the length of the artificial day, are given one extra feed about 8 p.m. It is stated that there is a net gain in growth and weight of 50 per cent.—*i.e.*, that chickens at one month old are found to be as forward as birds six weeks old reared under the ordinary non-forcing conditions.

"Various experiments here have been made with regard to the space required, and the result of these indicates that the greatest success is obtained by keeping the hens or pullets in small numbers —six in each pen measuring 6 ft. by 5 ft. In actual practice at the Orpington Poultry-farm a large shed about 200 ft. long, with a central gangway, is used, the side spaces being divided off into pens of the size mentioned. The forcing by means of electric light is commenced in the month of October, and pullets hatched early in March, and just beginning to lay, are used. The electric light is turned on from 6 a.m. to 8 a.m., and again from 4 p.m. to 10 p.m., an extra feed being given at 8 p.m. The birds are not allowed out of their pens, but exercise is ensured by scattering their grain on the floor, which is covered with short chaff. I am informed that from records kept and compared with those relating to similarly bred pullets kept under ordinary conditions the result is a gain in eggs of from 25 to 30 per cent., and in a few exceptional cases up to 40 per cent. The best results are obtained by forcing the pullets for only one season, but, if desired, the same birds could be used again the following October, provided they had

had a summer's run ; but the egg-production during the second season is not quite up to that of the first.

"Of course, the same principle could be applied to much smaller pens or buildings. As a matter of fact, when in the experimental stage small portable pens were used, and were lighted with ordinary hurricane lanterns."

The Poultry Instructor's Opinion.

The following report on the subject was made by Mr. F. C. Brown, the Poultry Instructor, to the Director of his Division, Dr. C. J. Reakes, M.R.C.V.S. :—

"On the face of it the forcing of birds to prematurity by means of electric light is one of those short-cuts to increased production which will prove disastrous in the long-run. In fact, it will carry its own condemnation to the practical poultry-breeder. If we are to encourage the production of vigorous, disease-resisting, and profitable stock, it cannot be emphasized too strongly that birds must be brought to maturity in a natural manner and in a natural time. They must certainly be well fed, but even in the diet nothing must be included which will hasten the young birds to premature development. Even if it paid to force laying birds to early maturity by the use of artificial light, it would, to my mind, be a fatal mistake to treat in this manner birds which are intended for breeding purposes."

The Waerenga Experimental Farm sent out 731 gallons of wine last month, valued at £231 8s.

The value of honey imported into the United Kingdom during the month of April this year was £4,747.—*T. W. K.*

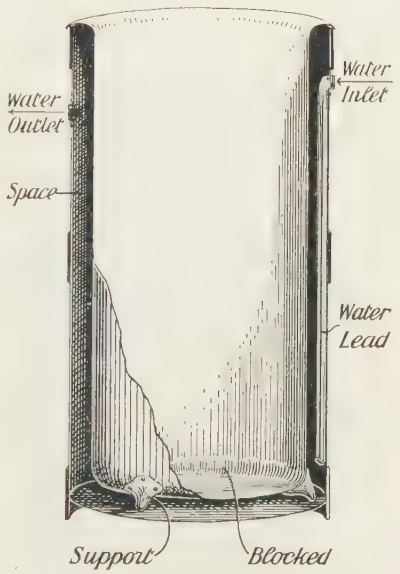
Many farmers inspected the experimental farms last month. The visitors to Ruakura numbered 998, to Moumahaki 184, to Tauranga 200, and to Waerenga 84.

A member of the visiting British party of scientists who has already seen something of New Zealand, while on his way to the Science Congress in Sydney, is Mr. E. S. Bevan, the great English barley expert. His plant-breeding researches, carried out in conjunction with Professor R. F. Biffen, of Cambridge University, have proved of great value to the barley industry of Great Britain, while his far-reaching conclusions are of fundamental importance in future plant-breeding work.

AN IMPROVED MILK-CAN.

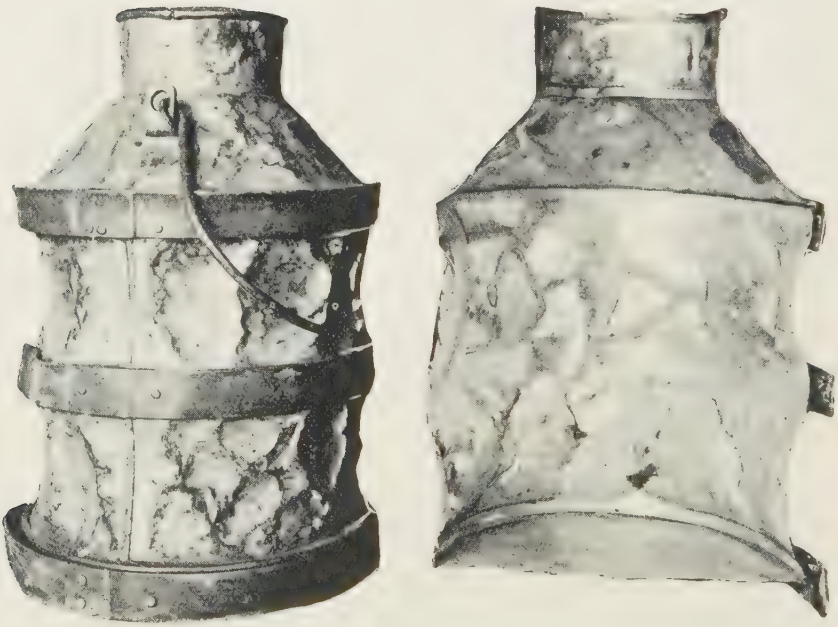
The damage to milk-cans during railway and other means of transit, accentuated by careless and often needlessly rough handling, is very great. Not only does it seriously handicap the farmer in his endeavour to deliver milk in a sound condition, but is a drain on his profits, owing to the frequent repairs necessitated and the short life of cans under such treatment. The battered condition of many cans, especially those used for city milk-supplies, quite prevents their being cleaned in a proper manner. The farmer is blamed for defects in condition or flavour of his milk, which are sometimes entirely due to his cans being so badly knocked about that the carriage of milk in them in a sanitary state is rendered impossible.

The invention of a can which will withstand rough treatment—that may be dented and yet will retain a smooth interior surface—is much to be desired. It would appear that just such a can has been invented by an officer of the Department—Mr. A. T. P. Hubbard, Inspector of Stock, Masterton. This can is claimed by the inventor to be able to withstand all reasonable rough handling and yet be unaffected for its purpose: in short, that it may be quickly and effectually cleansed, that it will last very much longer than the type of can at present in use, and that it will retain its true carrying-capacity. It is also claimed for the can that it will provide an efficient means of cooling milk without the cost of installing any special cooler, and will, further, provide a means of maintaining milk at a low temperature during transit, which fact will obviate the necessity of standing cans of milk in streams, water-troughs, &c., during hot weather.



The Improved Can.

THE CAN USED FOR COOLING MILK.



BATTERED CANS COMMONLY IN USE.

The main feature of the new can lies in the fact of its being a double can, as shown in the accompanying sectional diagram.

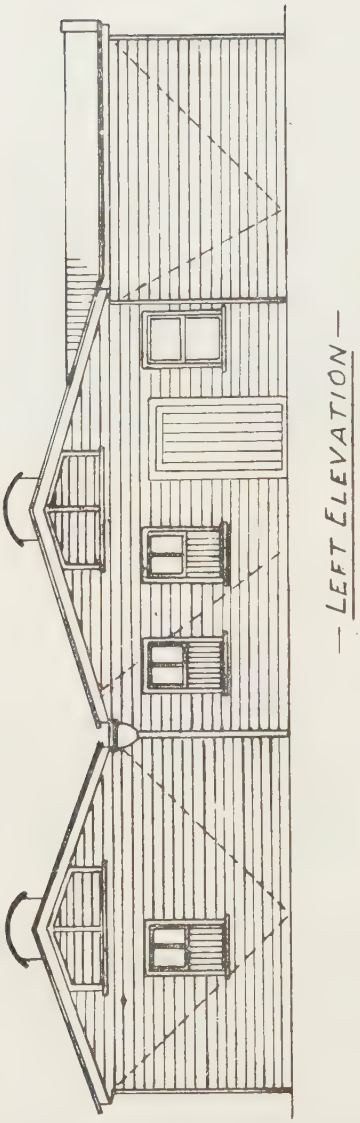
During the milking process the cans may be used as a cooler in the following manner: A piece of half-inch hose is connected at one end with a water-tap, and the other end is inserted into a hole at the top of the can, the water circulating between the two casings of the can and finding an outlet at a hole near the top of the opposite side of the can. The outlet may in turn be connected by a short length of hose to another can, and so on with as many cans as desired. Thus, provided the milk within the cans is occasionally stirred, there can be little doubt that the temperature of the milk would be very considerably lowered. When sufficiently cooled, or when the milk is ready for despatch, the hosing is removed and screw caps are affixed to the inlet and outlet holes. This leaves the space between the two casings full of water. In addition to assisting in keeping the milk at a low temperature until it reaches its destination, this water jacket should act as a buffer and add to the resisting-power of the cans against damage in transit.

SHEARING-SHED PLANS.

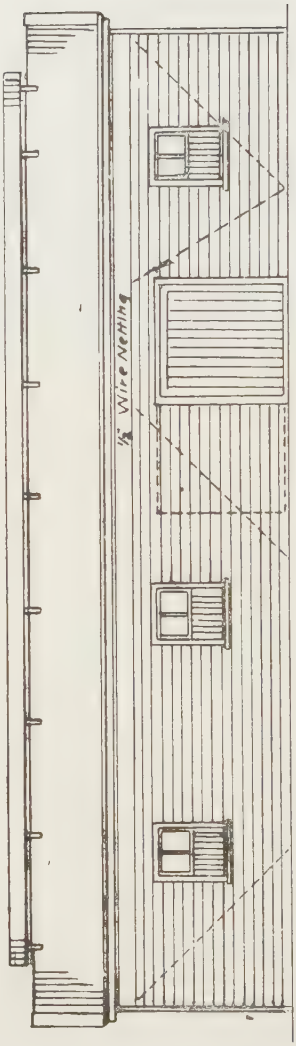
THE plans on the following pages, from designs by Mr. J. L. Bruce, Assistant Director of the Live-stock and Meat Division, are of a wool-shed which should not only give a good workable plan for the sheep-farmer managing a moderately large flock, but, amended, will suit even the man working a small flock. It will be observed that the implement-store, &c., is readily available for holding sheep, and that the shed will hold about a day's shearing.

A party of farmers, arranged by the Hawera Branch of the Farmers' Union, visited the Moumahaki Experimental Farm last month. Members spoke highly of the work being done, and expressed a wish to visit Moumahaki again in the spring.

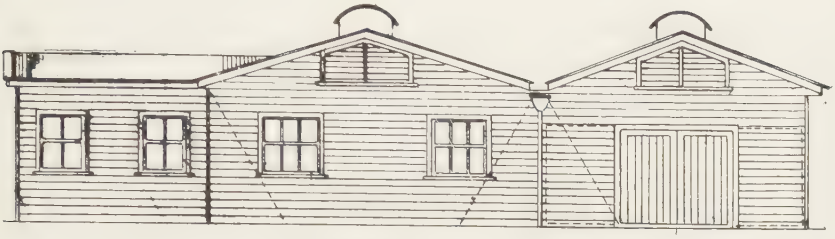
The Canadian Bankers' Association, of Winnipeg, has offered to contribute £200 in prizes at the Manitoba Winter Fair for beef-animals prepared for show and exhibited by boys under seventeen years of age. The grant is to be an annual one. The £200 will be divided into twenty prizes, the first being £20, and the amounts decreasing gradually to four prizes of £5 each.—*London Standard.*



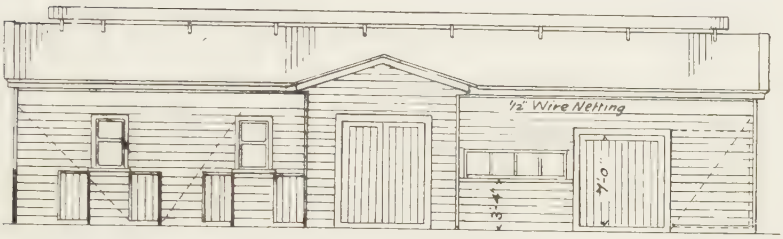
—LEFT ELEVATION—



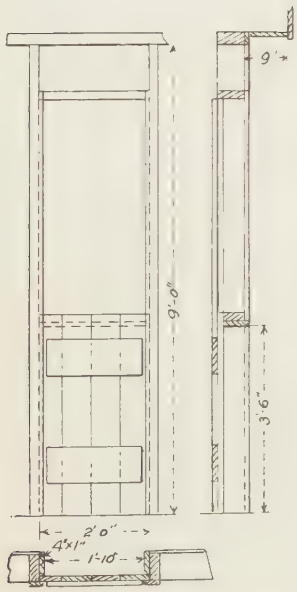
—REAR VIEW—



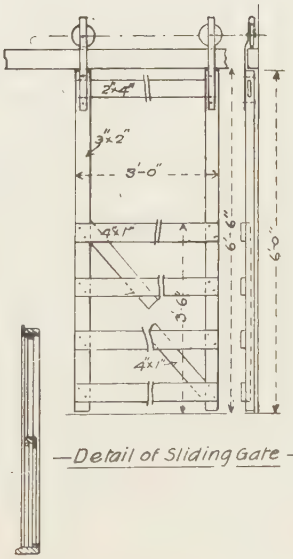
— RIGHT ELEVATION —



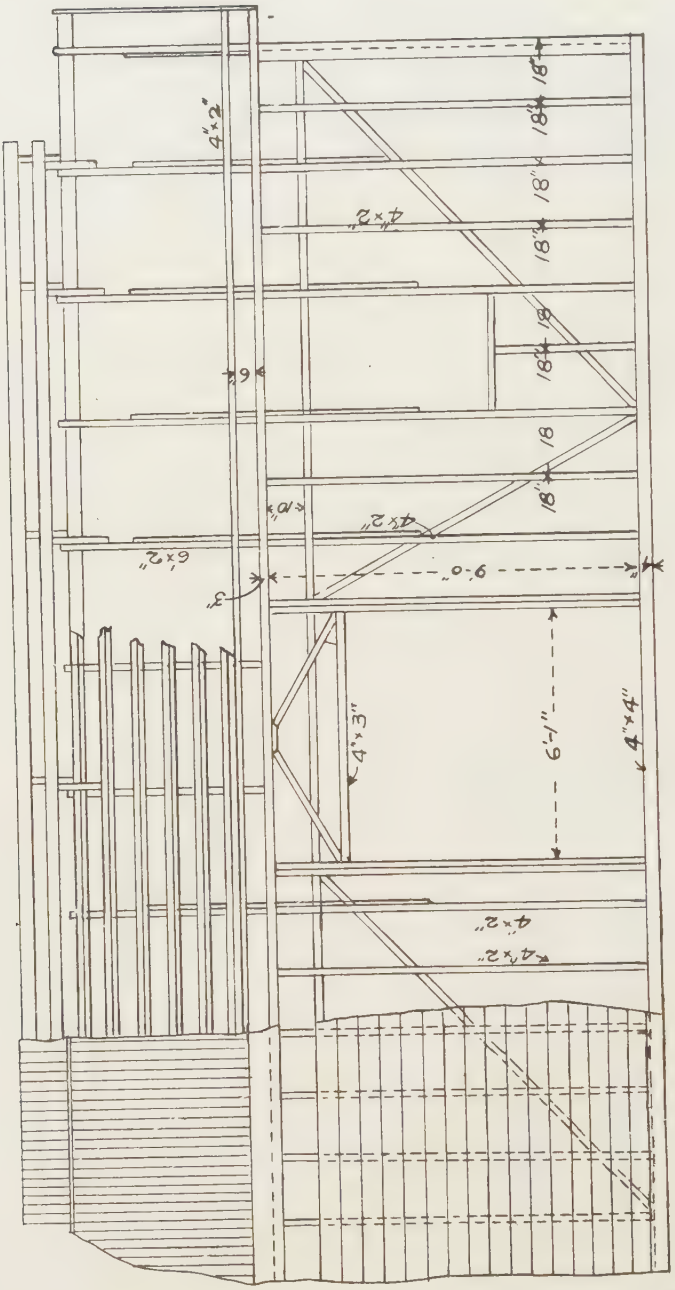
— FRONT VIEW —



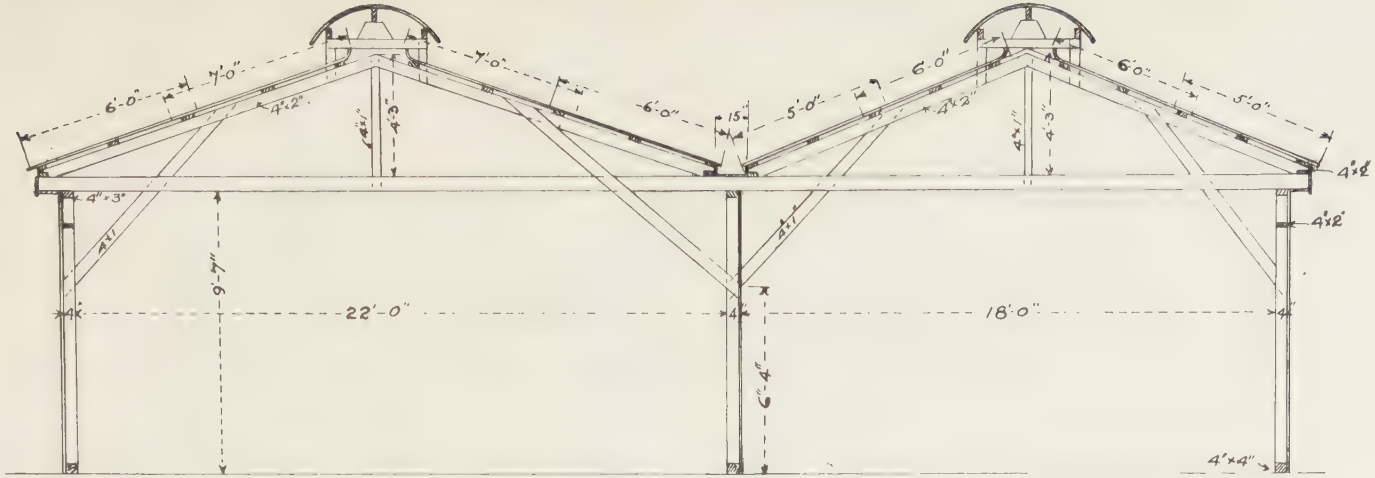
Detail Slip Up Doors —



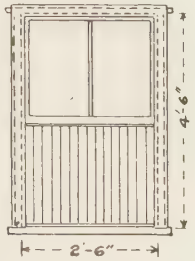
—Detail of Sliding Gate —



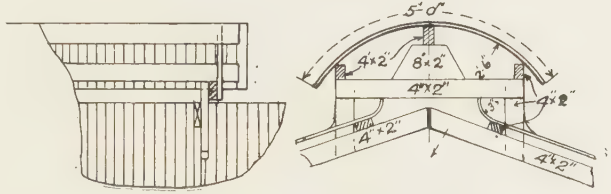
—Framing—



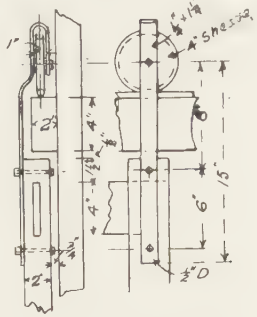
— Section on Line A.B. —



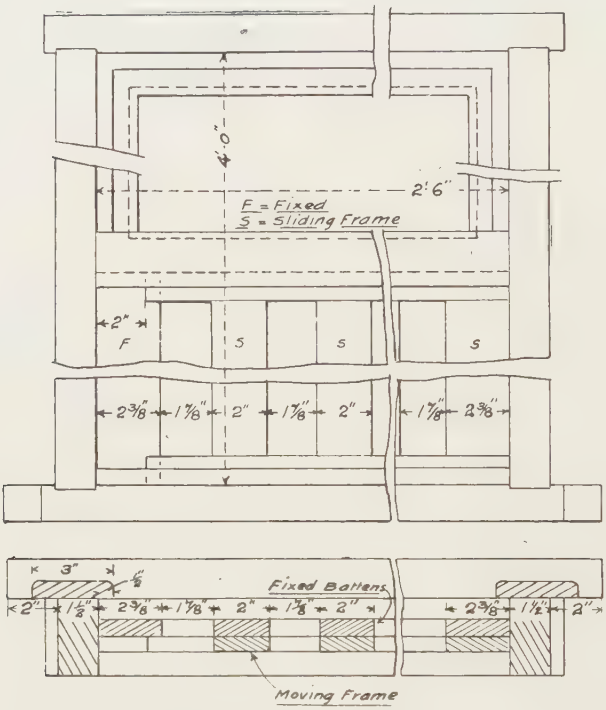
— Elevation and Section —
— of —
— Hit-and-miss Windows —



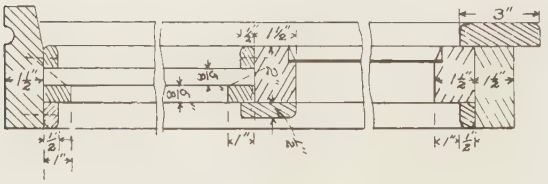
DETAIL OF VENTILATOR.

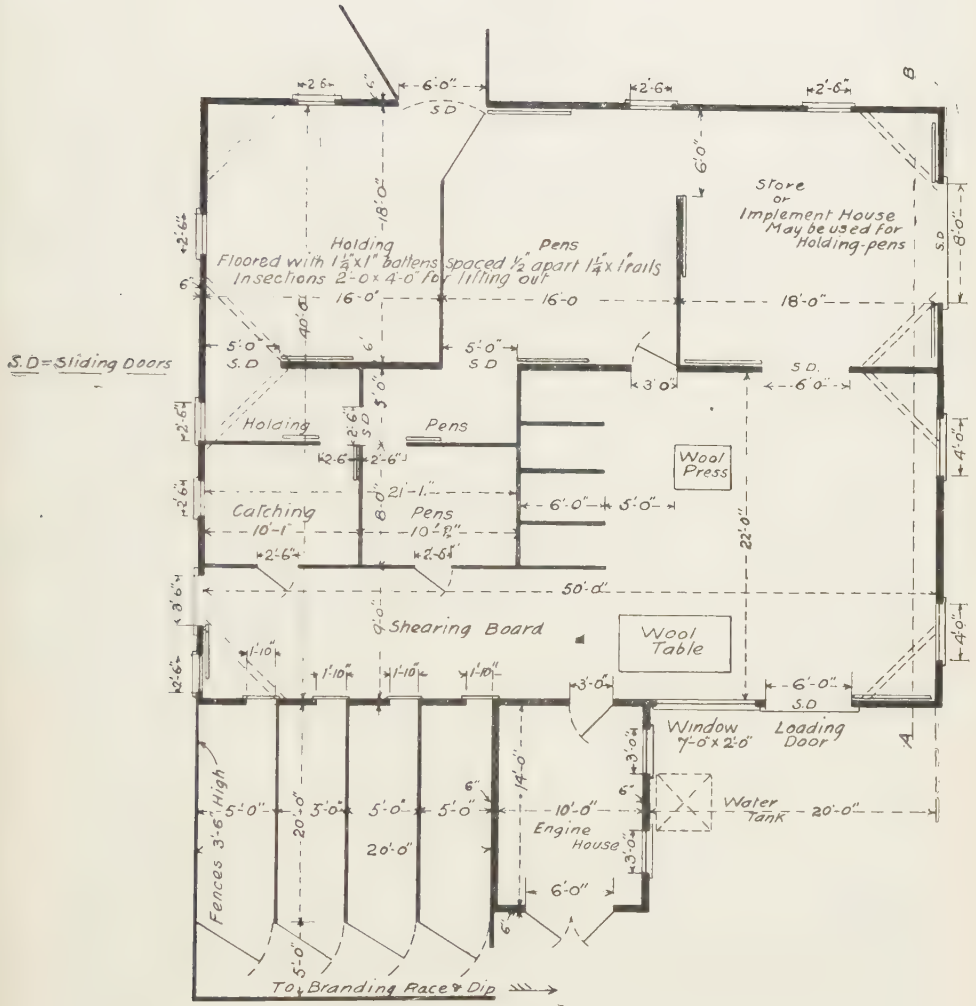


— Detail of Sliding Gate —
— Hanger —



— Detail of Hit-and-miss —
— Windows —




S.D=Sliding Doors
Holding Pens
Floored with 1½"x1" battens spaced ½" apart 1¼"x1" rails
Insections 2'-0"x4'-0" for lifting out
Store or Implement House May be used for Holding-pens
Holding
Pens
Catching Pens
Wool Press
Shearing Board
Wool Table
Window 7'-0"x2'-0"
Loading Door
Water Tank
Engine House
Fences 3'-6" High
To Branding Race & Dip
S.D
A
B

PLAN

THE RABBIT PEST.

CONTROL BY EFFECTIVE FENCING.

J. W. Deem and G. H. Jenkinson.

The control and final suppression of the rabbit pest are problems which can be solved only by approaching them with the determination of carrying out a vigorous and continuous warfare until the rabbit is finally exterminated. Half-measures will not do. One fact that should be realized is that it is useless attempting any means of suppression if measures are not taken to prevent fresh invasion from neighbouring infested country. Thus, wire-netting fences become a matter of vital interest. Recently an incident came under our observation of the value of effective wire-netting fences where the control of the pest by other methods had failed. The property in question—a run of 7,000 acres in the Wellington District, broken and mountainous country—presented in parts unusual difficulties in dealing with the pest. In the season 1909–10 the place was overrun with rabbits, the more favourable portions of the property being honeycombed with warrens, many faces having the appearance of a desert, being to the eye as devoid of grass as a city street. The pest apparently was in entire possession, and efforts were made to control the rabbit by means of various poisons. These failed or were only in part satisfactory, although proving effective on adjoining properties.

It was recognized that absolute isolation was imperative. The erection of rabbit-proof-netting fences was then decided upon. Netting was attached to existing fences where found suitable, and new fences were erected on favourable lines. By this means the run was divided into nine rabbit-proof blocks. As each block was made secure the work of destruction began in earnest. Trappers were employed for a time, but the main work was done with dogs and the pick. The burrows were dug out and generally as much cover as possible was destroyed. Now the owners have received their well-merited reward. The rabbits have been almost entirely exterminated on this large area of 7,000 acres. On a recent inspection, extending over some seven or

eight hours, only one rabbit was seen, and very few fresh traces of the pest were apparent. In parts where three short years ago the rabbits swarmed in thousands and the ground was absolutely riddled by them, the present condition, the well-grassed land carrying a profitable flock of sheep, makes it difficult to realize that the rabbits had only a short time since been practically in full possession of the country. Several men are still employed in rabbiting, the manager being fully determined to wipe the pest right out. As the rabbits decreased the desert-like appearance of the run was transformed. Rye-grass and clover came away in a manner little short of marvellous. To-day it is questionable if better pasture could be found on similar land in any part of the Dominion. This run not only presents a great lesson in rabbit-destruction, but is a splendid demonstration of what nature will do in the way of restoring grass if she is only afforded a chance.

As to the practical result of this process of eradication, this year the number of sheep has been increased by two thousand, and from all appearances the property is capable of carrying a considerably larger number. The output of fat sheep, which is one of the surest indications of the capabilities of a property, ceased in 1907, but this welcome means of revenue began again last year, since when large drafts of fat stock have been sent away. At the present time the whole flock is in first-class condition. For the year 1912–13 140,000 rabbits were destroyed by the rabbiters, exclusive of those killed by poison. Now, assuming that ten rabbits eat as much as one sheep, it is hardly necessary to point out that the unprofitable rabbits referred to —140,000 in number—have consumed the food of 14,000 profitable sheep. A glance at the number of rabbits taken from one or two particular subdivisions will be of interest, and will give those who have not been forced to fight the rabbit pest some idea of the state to which a piece of country may become if neglected. For the year 1912–13, from No. 1 block of 400 acres 6,000 rabbits were taken, while from No. 2 subdivision of 800 acres 18,500 rabbits were destroyed. This latter block in 1912 grazed 800 sheep, and carried them badly. It is now carrying 1,300, and has the appearance of a first-class dairy farm. On No. 5 block, containing 1,100 acres, 34,000 rabbits were killed. Three years ago this division was the most completely devastated portion of the property. It is now a sight pleasing to the grazier's eye.

It will be admitted from the foregoing facts that the most important step that may be taken for the control of the rabbit pest is the erection of suitable fences. A few notes on the

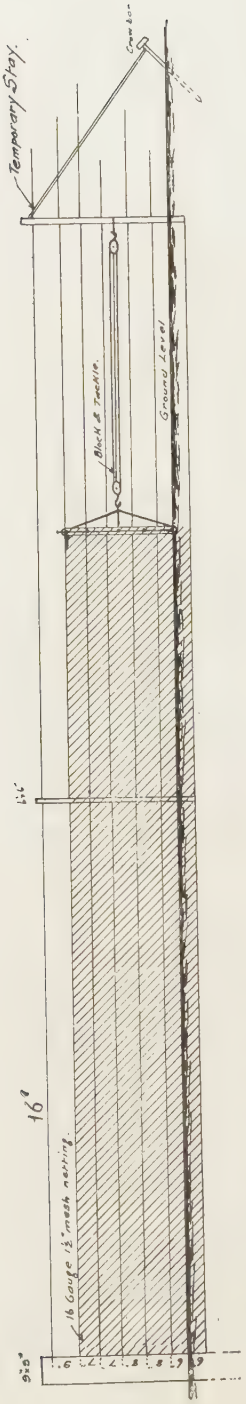


Fig. 1.

construction of such fences may be of assistance to those contemplating this sane method of control.

RABBIT-PROOF FENCES.

The first question to consider in erecting netted fences is the selection of suitable lines presenting as few difficulties as possible. For preference they should follow the tops of spurs, thus avoiding slips, rolling stones, and creeks. Having decided upon the routes the fences are to take, the lines should be carefully cleared. The approved boundary-fence consists of four posts to the chain, with twelve battens or droppers and five plain wires and one barb. Netting, 16-gauge, 1½ in. mesh, 42 in. wide. On fairly level routes 36-in.-wide netting can with confidence be substituted for the 42 in. For subdivisional fences, netting 17 gauge, 36 in. wide, will be found suitable. All posts should be sunk at least 2 ft. in the ground. Split posts should be put up with the flat side facing the netting and the true line taken along these flat sides, not along the centre of the posts. In depressions it is necessary to foot or stay all posts. The footing can be done by fastening a piece of wood 14 in. or 15 in. in length on the foot of the posts, or they can be stayed by means of wire. Having the posts in position, put on and strain up four plain wires at distances shown in Fig. 1. When the posts and wire have been erected a trench should be cut. This should be of a depth of, say, 7 in., to take a 6 in. selvage of the netting. The trench should have a perpendicular face running along the line and should be flush with the flat sides of the posts, the guide being the bottom wire. Now place the netting in position; this should be evenly fastened to the straining-posts at the starting-point. There are two ways of tightening netting. Probably the easier method is to strain between each post. To strain under this method insert an iron rod in the top mesh and,

by using the post as a fulcrum, lever the netting until sufficiently tight, and then staple (Fig. 2); repeat this performance at intervals of, say, 6 in. down to the bottom. The other method of tightening the netting is to stay (temporarily) a post just clear of each length of netting, and strain by means of a small block and tackle attached to a rod connected with the netting, as shown in Fig. 3. Where, owing to inequalities in the surface of the ground, the netting is caused to sag at the bottom a piece should be folded over at the nearest post and stapled thereto. If the bottom of the netting does not come low enough in hollows to allow of it being placed the necessary depth in the ground, lace a short piece of netting to the bottom of that already hung. The netting having been hung and strained, the fifth plain wire can be put in place: this goes on the outside of the netting about 6 in.

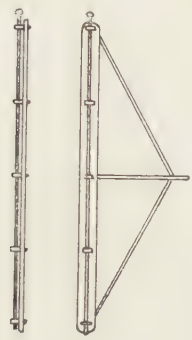


Fig. 3.

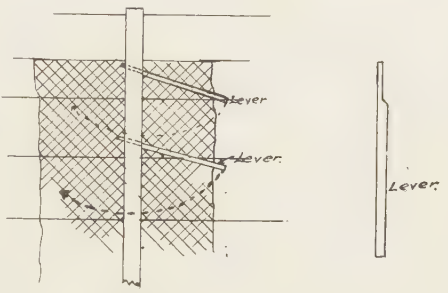


Fig. 2.

from the top, to give security. The netting should be laced to the wires between each post or batten, using 17-gauge wire. The netting must be sunk 6 in. in the ordinary ground with which we are dealing, but 2 in., say, would be sufficient in rocky ground. Where the fence has to cross a running stream or gully liable to flood a flood-gate must be provided. This is easily made by a length of netting suspended from a light cable made of three twisted wires running from post to post on each side. This hanging length must be on the low side of the fence so that it may swing freely during floods, and must be sufficiently low to give at least a 6 in. lap resting on the ground. A few stones placed on this lap will keep the netting in position until floods displace them. When floods have passed the netting can be re-adjusted and the stones replaced. It is imperative that netting fences be frequently examined, and particularly after every flood. In making gateways, place a sleeper or a heavy piece of timber

having a flat topside and level with the surface between the posts. Gates must be netted and hung low enough to just clear the sleeper. Each strut or stay must be protected to prevent rabbits from climbing over: this can be accomplished by placing a hood-shaped piece of netting on the strut or stay (see Fig. 4), or a system of staying may be adopted, as shown in Fig. 5. The remaining wire, the barb, is placed 9 in., say, above the top of the netting.

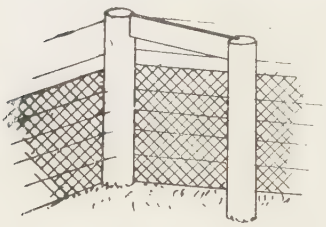


Fig. 5.

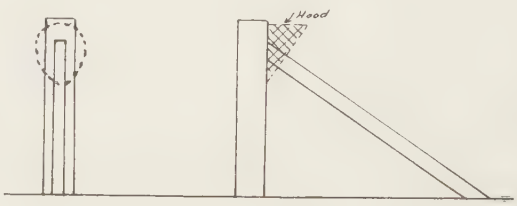


Fig. 4.

The cost of the boundary-fence described herein is estimated at £1 9s. per chain. If 36 in. netting is substituted it will run about £1 7s. 6d. Netting can be attached to existing suitable fences at a cost, including labour, of, say, 11s. per chain; in this estimate the labour is reckoned at 3s. 6d. per chain.

Just one word in conclusion. Experience has fully proved that in vermin-infested country netting fences are an absolute necessity if the land is to be put to its full use.

According to experiments conducted at the Harper Adams Agricultural College, England, both lime and gas-lime applied up to 10 tons per acre were found to be effective in suppressing sorrel. There appeared to be no additional advantage in a heavier application than the 10 tons. There is every evidence, says the report, that systematic liming is the best means of dealing with sorrel.—*Journal of the British Board of Agriculture.*

Experiments conducted in Germany with seven different kinds of soils extending through two years, to determine the influence of various factors of growth, especially water, on the maximum yield, went to show that the ratio of grain to total yield decreased as the water-supply increased. The nitrogen-content of the crop decreased, while the potash, and especially the phosphoric acid, increased, with the increase of the water-supply.—*Experiment Station Record, U.S.A.*

AGRICULTURE ABROAD.

THE COST OF OCEAN CARRIAGE:

ITS INFLUENCE ON THE WORLD'S PRICE AND THE HOME PRICE OF PRODUCTS.

David Lubin, Delegate of the United States to the International Institute of Agriculture, Rome.

Introductory Note.

The slightest turn of the wheel directs the motion of the automobile. The slightest change in the cost of carriage directs the price-movement of the staples. The slightest movement in the world's price of the staples directs the economic, the social, the political life of the people. What the wheel is to the movement of the automobile, that of the cost of carriage is to the price-movement of the staples.

Given farming districts tributary to a local commercial centre, and the results of abnormally high or unsteady rates of carriage on farm products to that centre will soon make themselves manifest in those districts in trade depression and its concomitant evils. Widen the area and let it be a State thus affected, and you widen the area of the evil. Widen the area affected still further until it embraces the various sections of a nation, and you enlarge the area of the evil until it beomes nation-wide.

The modern trend is shown in the various efforts to combat this evil and to hold it in check—in the small districts through farmers' organizations with the aid of local Boards of Trade and local government; in the State through State organizations and State legislation; and in the nation, if strongly centralized, or if it own the means of transportation, through central Government action, and when not strongly centralized, as is the case in the United States, through an Inter-State Commerce Commission.

And here the endeavour to check this evil seems to end. But is this sufficient? By no means; not so long as the endeavour stops short of so important a price-determining factor as the cost of ocean carriage in international trade.

It must be borne in mind that in international trade the cost of carriage not alone determines the home price of the staples in the country from which the product is exported, but it becomes a factor in shaping the world's price; hence, indirectly it becomes a factor also in determining the home price in other countries.

Now, supposing the cost of ocean carriage be abnormal, unknown in advance, and subject to sudden fluctuations, what effect must all this have? Must it not tend to disturb the economic, the social, and the political life of the people everywhere?

And is not this the case at the present time? Is not the cost of ocean carriage abnormally high at one time and abnormally low at another, unknown in advance, and subject to sudden fluctuations?

And what is the remedy ? What but an International Commerce Commission on lines similar to the Inter-State Commerce Commission of the United States ? A Commission that will bring about normal rates, rates known in advance, rates not subject to sudden fluctuations.

That there is precedent for this can be seen from the Commission known as the International Postal Union. The Postal Union was formed for the purpose of doing away with former crudities in the international postal service, and we all see how well it has performed that service and how valuable it has been to the world. Yet, great as was the need for the International Postal Union, it is transcended by the need for the proposed International Commerce Commission.

Such a Commission must come some time. Why not now ?

THE NEED FOR AN INTERNATIONAL COMMERCE COMMISSION.

In my annual report for 1913 to the Secretary of State, on the work of the International Institute of Agriculture, I stated, " The monthly crop reports of the Institute now exercise a decisive influence on price-formation for the staples of agriculture, as evidenced by the serious consideration given them by the Press of the world."

Important as this work is, it was, however, understood from the start that the world information on area and production of the staples only dealt with one branch of the price-forming factors, and that the Institute would from time to time, as permitted by its treaty, enlarge this service until it should embrace all price-determining factors for the staples. As the cost of ocean carriage so largely influences the world's price and the home price of these staples, it occurred to me that the time had come for the Institute to take up the service on freight rates for ocean carriage. Accordingly, at the last General Assembly (May, 1913) I presented a paper to that effect. As a result it was decided that the Institute make preparatory studies along these lines.

Since then I have taken the matter up with various correspondents, amongst them the Hon. Walter Scott, Premier of Saskatchewan (Canada), from whom I received two letters on the subject (21st October and 24th December). In replying to these letters important features of the question presented themselves which led to the following paper.

In his letter of the 21st October Mr. Scott said, " The subject of the cost of ocean carriage is being given a great deal of attention in Canada, so much so that the head of the Canadian Railway Board (Mr. Drayton) was recently sent to England to inquire into the question with the purpose of ascertaining whether any action is open to the Canadian authorities which would likely lead to a lessening of the exceedingly high rates in force at present. These rates, I understand, have within the past two or there years been largely increased. . . . The question has become acute in Canada."

I have since received from Mr. Doherty (Canadian Commissioner to this Institute) a newspaper report on Mr. Drayton's inquiry. I note that Mr. Drayton points out that the subject has already engaged the attention of the British Board of Trade, which, in 1910, communicated with the Under-Secretary of State regarding it. The report states, " On the 15th April, 1912, in pursuance of a resolution passed by the Imperial Conference of 1911, on the motion of the Canadian Prime Minister, a joint Royal Commission was appointed. . . It has visited Australia and New Zealand, and has taken evidence on the subject of freight rates between the United Kingdom and those dominions."

I note further from the report that one of the proposals advocated by Mr. Drayton is the establishment, between Great Britain and Canada, of a " joint tribunal " for the purpose of fixing rates. Explaining the purpose

of this "joint tribunal" he says, "There would seem to be no reason why standard maximum rates should not be fixed by an independent authority."

This is interesting to me, for in the study of this subject I was led, some six or seven years ago, to a like conclusion, though wider in scope, which I then presented to ex-Secretary Wilson, of the United States Department of Agriculture. The conclusion I arrived at was that the economic interests of all concerned would be served by the establishment of an International Commerce Commission, with functions and powers on the lines of those of the American Inter-State Commerce Commission.

But the question then arose, would such an International Commission be able to enforce its rulings? That, of course, would depend upon the powers vested in it. It could, for instance, be constituted simply as an advisory and consultative body; or it could be given powers under a treaty fully as large as those conferred on the United States Inter-State Commerce Commission.

And now let us return to the consideration of Mr. Drayton's proposal for a "joint tribunal." The following objections to its practicability occur to me if it were to be limited to Great Britain and Canada. In the first place, this proposal could be construed as an attempt to coerce the shipping interests, the world's carriers, into conceding special advantages in the matter of ocean carriage to Canada directly and to Great Britain indirectly at the expense of other countries. In the second place, as the home price of the staples is governed by the world's price, the proposed special advantage for Canada would be largely neutralized through the influences exercised on the world's price by the freight rates prevailing in countries having no such special advantage.

I think it can be shown that the question before us cannot be narrowed down to the limits of one or two countries: it is broader than a local issue; it is broader than a national issue; it is, in fact, an international issue. Nor can it be narrowed down to a mere question of high rates or low rates. The real question is one of steady rates, fixed rates, equitable rates, rates periodically fixed in advance for the principal world's ports and promptly made public. That there is an adequate basis for this stand can be clearly shown by the following illustration: Let us say that the price of wheat is $1.00 a bushel in Liverpool; that is to say, $1.00 a bushel is offered for wheat delivered at the Liverpool warehouse. Wheat is, therefore, worth $1.00 at the exporting ports—at New York, Seattle, Montreal, Rosario, Odessa, &c.—less the cost of carrying it from any of these ports to Liverpool. Now, if the cost of carrying wheat from New York to Liverpool be 24 cents, these 24 cents will be deducted from the dollar, leaving the New York price at 76 cents; 76 cents not only for the quantity exported, but also for the entire quantity in the home market, for it is a well-known fact that the home price and the export price is the same. But if the cost for carrying be nothing —if wheat be carried, say, from New York to Liverpool free of charge, as ballast—the price in New York would then be (baring deductions for minor expenses) $1.00, as in Liverpool. So here we have an example in which the price in New York is a dollar a bushel one day and 76 cents a bushel the next day.

That this is no fanciful or overdrawn statement is shown by the following: In reply to my inquiry as to whether this Institute could be supplied with regular reports on the cost of ocean carriage, the New York Chamber of Commerce informed me (24th November, 1913) that as there was so much fluctuation in the rates for ocean carriage the publication of those rates could not be of economic value. Corroborative of its statement the Chamber said, "Freight rates, particularly for agricultural products, change almost daily, and sometimes several times during the day. . . Rates quoted

to-day would be only for refusal for twenty-four hours. . . . Frequently wheat has been carried between the United States and London free of any charge, being simply used for ballast in the steamers, and at other times the rate has advanced to 10d. and 12d. per bushel."

It seems to me that instead of disproving the needs for the proposed service, the New York Chamber of Commerce has given facts which strongly support my contention, for here we have an example of the cost of freight ranging anywhere from nothing to 12d. (24 cents) per bushel.

Apart from the question whether these charges be equitable or not, if variations in freight rates were known in advance, there would then be an opportunity to regulate buying and selling accordingly. But when the rates fluctuate as suddenly as in this illustration, and when the cause of these fluctuations is uncontrolled, in what position does this place buyer and seller ? In what position does it place producer and consumer ? And right here is where the opportunity comes in for price-manipulation ; manipulation for underpaying in buying and manipulation for overcharging in selling. And who foots the difference ? Is it not the farmers on the one hand and the consumers on the other ? To be sure it is The farmers and the consumers of one country? Yes, and of two countries, and of ten countries, and of fifty countries—the farmers and the consumers of the whole world.

And what about this underpaying and overcharging ? What is its effect ? Does it not frustrate that more equitable economic relation which would otherwise exist ? Do not the evils consequent on such economic disturbance permeate in every direction ?

And what is the cause ? Let us see if it cannot be traced to the present mode of rate-fixing for the cost of ocean carriage ; a mode which, while it secures to the few having advance and private information on freight rates a free hand in one market and a free hand in all markets, leaves the great mass of buyers and sellers in perplexity, a mode which forces the transactions of buyers and sellers down the level of guesswork.

Here is the case : Given a combination of shipping interests with its board of directors making out the routes in advance, with a private understanding as to what the rates are to be in the various ports, and given further that this advance information is used on the bourses or exchanges, and what is likely to follow ? What but this : that the few holders of such advance information will be in a position to operate in the bourses or exchanges as successfully and with as little risk as a gambler playing with loaded dice when surrounded by unsophisticated and eager players. Moreover, the few holders of such advance information are not alone enabled to operate in one market-centre, but such information will enable them to mainpulate, directly or indirectly, the principal market-centres of the world, whether in exporting or in non-exporting countries, and to continue this kind of a loaded-dice game the year around, all at the expense of the producers and the consumers everywhere.

An example illustrating such a state of affairs was offered by the United States shortly after the completion of the transcontinental railways. At that time the artful and arbitrary manipulation of freight rates by the railroad companies placed the American farmer at the mercy of unscrupulous price-manœuvring of the staples. Law after law was enacted by the States in the endeavour to remedy this evil by regulating rates, but without avail. It was finally perceived that only inter-State authority could deal with the evil. As a result the Inter-State Commerce Commission was established, and this in a large measure has remedied the situation.

In a communication of the 22nd December, speaking on the impotency of purely national law to deal with the problems of price-manipulation, Sir Sydney Olivier, Permanent Secretary of the British Board of Agriculture, says, " My own opinion has long been that the operation of trusts being

now international, the problem presented by their development can only be efficiently handled by international conventions. . . . Work of this kind is work which the governments of the world will be more and more driven to undertake." Is not this a clear and concise statement of the case ?

We may thus see from all the foregoing that just as a permanent Inter-State Commission was required to adjust the equities in railway carriage between the several sovereign States of the Union, so a permanent International Commission is required to adjust the equities in ocean carriage between the sovereign nations of the world.

Assuming for the time being that such a permanent International Commission is required, what should be the consecutive steps towards its realization ? It would seem to me that the preliminary step should be for the adhering nations to transmit monthly to the International Institute of Agriculture the maxima, minima, and average ocean freight rates prevailing in the leading ports of the world. These data, when appearing for a stated period in the Institute's monthly Bulletin of Agricultural Statistics, placed for purposes of comparison alongside of those of production and of the prices current in the buying and selling centres of the world, would soon clearly manifest the need for the International Commerce Commission here proposed, for such reports would show what the prices were and what they should have been. This, in substance, is also favoured as a preliminary step by Sir Sydney Olivier. He says, " The collection and presentation, on a system internationally agreed to, of facts and statistics is an essential preliminary."

With this as a starting-point, the permanent committee could then submit to the General Assembly of the Institute a report calling for action towards the establishment of the International Commerce Commission. The second step would be the establishment of the proposed International Commerce Commission with consultative and advisory functions. The third and final step would be to enlarge the powers of said Commission until it would ultimately be granted powers and functions similar to those of the Inter-State Commerce Commission of the United States.

The basis for such a Commission is already here in the International Institute of Agriculture, which is established under treaty by the nations for dealing with economic problems along international lines.

But right here the question may be asked, " Would there not be great difficulty in bringing about the proposed International Commerce Commission ? Would not the great interests that profit under present methods block up the road ? "

Before answering let us first define what these interests are. In the first place come those few operators in the bourses and exchanges who have this advance information. In the second place come the shipping interests. As to the operators, it would be a serious mistake to underestimate their power and influence. Nevertheless, there are other powers and influences which, if awakened, would be more potent than theirs. There is the power and influence of public opinion, and there is the power and influence of united action by Governments. As for the shipping interests, the difficulty with them would not be so great, for, performing as they do a legitimate commercial function, they are entitled to a just compensation. Their interest centres in the volume of their net returns, therefore any condition best calculated to promote their net returns would be sure to meet with their approval.

I believe it can be shown that the proposed International Commerce Commission would not merely be in the interest of producer and consumer, but likewise so of the shipping interests. I believe it can be shown that it would increase their net returns. This point will be taken up further on. Right here let us touch upon the glaring defect of the present system, a defect which not alone jeopardizes the net returns of the shipping interests,

but which is the root and cause of the disturbance existing under present conditions, a disturbance so far-reaching as to affect the equities in the world's price and the equities of the price in the home markets; a disturbance which, directly and indirectly, affects the economic, social, and political conditions of the people everywhere.

The defect which I refer to is the lack of organized method in the assembling of incoming and outgoing cargoes. As a result the net returns of the business of ocean carrying are rendered precarious, hazardous, and inequitable. Sometimes the charges are nothing, when a cargo of wheat may go as ballast, and right thereafter the carrying charge from the same port (as was shown before in my quotation from the New York Chamber of Commerce letter) may be as high as 12d., or 24 cents, per bushel. Speaking on this subject, the delegate of Argentina to this Institute says, "This question is of the greatest importance for my country, for it is well known that her agricultural exports, not only of cereals but also of frozen meats, are increasing every year, and sometimes these increases are so unexpected that the shipping companies have not provided sufficient ships for the requirements of the case."

A pertinent comment is likewise made by the delegate of Russia, who says, "The chief point in the matter is really the difficulty of obtaining return cargoes for each voyage of the ships, and the necessity of returning in ballast is often one of the chief reasons of the irregularity in the freight rates."

And now let us return to the proposal for the International Commerce Commission. I think that its adoption would afford a remedy for the situation. Under such a Commission it seems to me there is every reason to believe that it would be possible to organize and carry out a system for synchronizing freights everywhere, thereby ensuring full outgoing and incoming cargoes.

It will be conceded that the mean rate resulting from the work of the proposed International Commerce Commission would, by a more equitable adjustment of the local incidence of the rates, by levelling the abnormally high and the abnormally low charges, be likely to bring the carriers a higher net return, and at the same time would greatly promote the interests of producers and consumers by steadying the world's price.

Fortunately, the International Institute of Agriculture is here, and could serve as a ready means for carrying out the work of the said Commission towards this synchronizing system. The Institute being a Government institution in direct communication with fifty-three countries could, if empowered to do so, enlist in this service the active co-operation, through organized and regular correspondence, of the Chambers of Commerce, Boards of Trade, and the farmers' organizations in those countries. With this accomplished, there would then be no reason why ocean freight rates could not be fixed in advance, and made public far enough ahead to serve the necessary purposes of all concerned in production and distribution.

But there is yet another difficulty which must not be lost sight of, and that is the attitude the nations may be expected to take on this question, a difficulty pointed out by all the delegates to the Institute to whom I have presented the matter. There are the interests of the buying nations and of the selling nations; the interests of those that have a large merchant marine and of those that have not; and, besides this, there are the various national policies, the national jealousies, and the real or imaginary conflicting national interests.

Notwithstanding, however, there are sufficient indications that the obstacles before us are not insurmountable. The unbiased onlooker will not have failed to observe that the past few decades have been remarkable for legislation along economic lines. There has, for instance, been the

legislation for legalizing associations of labour; the factory laws; the employers' liability Acts; the national sickness insurance Acts; the old-age pensions Acts; the anti-trust laws; the legislation on co-operative associations. Then there are the activities along these lines of the recently created Department of Agriculture, the Departments of Commerce, the Departments of Labour, and, in the United States, the Inter-State Commerce Commission.

And what, we may ask, has been the motive behind all this legislation? The answer is a simple one: it was intended to ameliorate the economic conditions of the people.

But all this time is there not a cause at work which powerfully tends to neutralize such legislation? Does not this cause set in motion destructive currents to permeate throughout the economic world? And do not these destructive currents result from the present anarchic mode of fixing the rates of ocean carriage for the staples? Does not all this produce constant economic disturbance in all directions?

The significance of all this will be clearly manifest when it is realized that the world's price of the staples does not merely govern the price of the quantity exported, but that it also governs the price in the home market; that it governs the price of the entire quantity produced or consumed. We thus see that it governs the price of every mouthful of food consumed, of every garment worn. It governs the cost of living for the man, for the woman, and for the child, and it governs it not only in one country but in every country in the world.

All this would indicate that the legislation above referred to as a means of ameliorating the economic conditions of the people is a mere palliative, dealing, as it does, with the effects of the evil and not with the cause. We see, further, that unless such legislation be reinforced by action which will free the factors governing the world's markets, the world's price of the staples, from the pernicious influences of chance and manipulation; unless such legislation be reinforced by some such device as the proposed International Commerce Commission it will fail in its purpose.

It would therefore seem to me that when the facts in the case will have been given the serious consideration their importance deserves the nations would freely consent to extend the powers of the International Institute of Agriculture to emblace the service outlined herein. This would round out the work of the Institute on the lines laid down for it by the treaty.

BUTTER SELLING THROUGH CO-OPERATIVE SOCIETIES IN GERMANY.

In Germany the economic importance of co-operative dairies surpasses that of any other branch of co-operation with the exception of loan and savings banks. At the close of 1912 there were 3,313 of these dairies, and if we add to these the other co-operative dairies having an organization different from that prescribed for co-operative societies the number rises to 4,100. According to Dr. Grabein, secretary-general of the National Federation of German Co-operative Societies, these dairies annually produce about 160 million kilograms of butter, to the value of 370 million marks, from about 4,500 million litres of milk. The butter thus produced is about a third of the total production of butter in Germany. The question of the sale of the butter produced by these co-operative societies has hitherto been but little discussed in technical literature, though it is one of the greatest importance to the prosperity of co-operative enterprise.

On this subject an article by Dr. Grabein in the July number of the *Bulletin of Economic and Social Intelligence*, published by the International Institute of Agriculture, is worthy of special attention. Butter, unlike cereals and cattle, may be sold direct to the consumer, and for this reason many of the co-operative dairies sell the greater part of their produce retail, especially when they are situated in districts having a dense urban or industrial population (Westphalia, Hesse-Nassau, the Rhine Province, south-west and central Germany). Very important also is the trade with the wholesale butter-merchants and the retail dealers. This form of sale is inevitable for dairies situated in places where much butter is made, and where there are but few densely populated urban centres (provinces of East Prussia, Grand Duchies of Mecklenburg and Oldenburg, Schleswig-Holstein, Hanover, and Southern Bavaria). Under such circumstances the co-operative dairies sell their butter principally to wholesale dealers in the great centres of consumption (Berlin, Hamburg, Dresden, Leipzig, Frankfort-on-Main, Cologne, &c.). Owing to their increased business, the dairies have united in federations.

The question has been much debated as to whether preference should be given to wholesale or to retail trade. Retail trade, with a large circle of customers, usually commands higher prices, and, besides, the societies can act more independently than when dealing exclusively with a few large purchasers. On the other hand, retail trade involves additional labour and expense, and more difficulty in the adjustment of production to demand on account of variations in the number of purchasers ; nor can this difficulty be met by a more extended trade carried on through the post. The wholesale trade in butter is carried on either at prices fixed for the whole duration of the contract, or at the prices quoted from day to day in the great markets for butter—in north Germany, chiefly Berlin and Hamburg. This latter system is to be preferred, because when sales are made at fixed contract prices the wholesale merchant is exposed to considerable risk, for which he naturally tries to compensate himself by paying lower prices.

There are at present nine central co-operative societies for the sale of butter, the oldest of which was founded in 1877, at Königsberg. Special efforts were made by these societies to put an end to the competition among co-operative dairies for the sale of their produce in the great centres of consumption, which had led to depression in prices and deterioration in the quality of the product. In Hamburg and Berlin there are two federations for the sale of butter by auction, the first of which was founded in 1886 by the district federations of the dairy societies of Schleswig-Holstein, and the second in 1907, on the model of the first, in connection with the co-operative dairies of Pomerania, Brandenburg, and Mecklenburg. These organizations have helped in a great measure to strengthen the position of co-operative dairies in the butter trade, giving them an influence in fixing prices, and encouraging improvement in the quality of the product. To attain this result the federations oblige the affiliated societies to consign to them the whole of their produce, except perhaps that part sold directly to consumers and retail dealers. The payment by the federation to individual dairies for butter sold is usually based not on the price actually obtained, but on the average price determined after classification of the product according to quality. This latter method has become necessary owing to the great increase in the business done. The classification and analysis of the butter periodically made by the federations is most efficacious in improving the quality. The federations guarantee their goods by their trade-marks, which are protected by law.

Dr. Grabein estimates the total value of the butter sold by the federations at from 40 to 45 million marks (roughly, from £199,000 to £223,500). Of this sum sixteen millions and a third is contributed by the North Germany Dairy Federation alone, which sells wholesale, and also retail in its own shops.—*Bulletin of the National Institute of Agriculture.*

WORK FOR THE COMING MONTH.

NEW ZEALAND is a country of wide variation in climatic and soil conditions. In applying suggested procedure it is, therefore, necessary for the farmer to amend it to suit local weather-conditions and the requirements of his soil—information which can best be ascertained by a study of these problems on the part of the farmer himself. Nothing can take the place of local knowledge. Little advice on an agricultural subject is capable of general application in its entirety.

THE FARM.

PRIMROSE McCONNELL.

Care of Stock.

With the stock-breeder and dairy-farmer this is perhaps the busiest month of the year, and the one most pregnant of far-reaching results. From early morning until late at night the greatest attention is required to ensure justice to the dams and their offspring.

Every dairy-farmer should have a milk-fever outfit, the cost of which is only a few shillings. On the first sure sign of fever the cow's udder should be well washed with a lysol solution, and before use the outfit should be thoroughly sterilized in boiling water. Pump the air into each quarter until well distended; withdraw the injecting-needle, and tie the teat with tape so as to prevent the escape of air for a short time. Keep the cow well propped up with sacks filled with chaff or other soft material, and if recovery is protracted turn her over occasionally. As a rule, one treatment is sufficient.

Opinions vary as to the desirability of keeping the calf some time with the cow or removing it immediately, and something may be said in favour of either plan, but in any case the colostrum, or first milk taken from the cow after calving, should always be fed to the calf.

There is considerable art in teaching a calf to drink from a pail, and the writer is of opinion that the fingers should be given only in very extreme cases. Get the youngster jammed in a corner, having at hand a liberal supply of the colostrum in a pail, which should have a fixed handle on one side. Hold the pail in the left hand, put the right on top of the head with the

fingers reaching down the forehead, and press the calf's nose into the milk. In nine cases out of ten the calf will drink at once.

After the calf is two days old, a pinch of carbonate of soda should always be given with the milk, to prevent the curdled milk in the stomach becoming so hard that it cannot pass into the bowels. Calves thus affected may die very suddenly, as if in a fit, but the carbonate of soda is an effectual preventive.

Some breeders advocate feeding three or four times daily, and undoubtedly this plan approaches closer to nature than the twice-a-day system, but I do not consider that the extra time and labour required is compensated for. Good results may be had by feeding twice only, and the writer invariably practises this system.

Calf-feeding is work that requires close attention on the part of the attendant, and it is to be deplored that it is often done anyhow, and by any one. Feeding all the calves from one trough is an abomination and the very essence of bad management. Where there is a considerable number of calves the "bail" system is the best, and a great labour-saver, but the buckets should be kept clean.

To keep the calf-paddock sweet it should be occasionally ploughed and resown, and where it is not convenient to do so heavy dressings of burnt lime should be applied, followed later by a liberal dose of phosphates. The lime will destroy parasites, and, along with the phosphates, is a necessity in building up healthy well-developed animals.

The remark is sometimes heard, "Oh, I can rear good calves on the 'kick and promise' system." Quite so; but how much better results would be had by adopting a system which at least contains the elements of common-sense? Unfortunately, a badly reared calf cannot be "unreared" and a demonstration made by rearing it on a better system, but a little thought should convince the most sceptical that a badly reared animal can never attain to the perfection reached by one reared on liberal lines. As a matter of fact, if stock are bred on the former plan year after year the whole herd must gradually deteriorate, as the constitution will be slowly undermined. Overfeeding is not advocated, but the food should be of such quantity and quality as will maintain the young animal in thoroughly vigorous condition, and attention to cleanliness and regularity is a necessity. In a valuable herd or flock an attendant with brains and experience, plus a willingness to put them into practice, is invaluable, and as a recompense to such a man no reasonable wage should be grudged.

Covers should come into use as the cows calve, taking care that they are removed in the daytime, except during very wet cold weather.

Mammitis, the greatest of all dairymen's scourges, should be guarded against as far as possible by wiping the udders with a cloth wrung out of a lysol solution, which is also used for washing the milker's hands. If a milking-machine is in use, a strong solution of boracic acid is preferable, both for washing the teats previous to and dipping them in after milking. For the latter purpose small tin mugs with handles are very useful. As soon as this disease is detected the affected cow should be isolated, and where there is any uncertainty as to the nature of the disease a sample of the milk should be at once forwarded to the Laboratory at Wallaceville, from whence reliable and prompt information may be obtained. Complete cures are rare, and I am strongly of the opinion that until a reliable preventive is forthcoming all affected animals should be sent to the boiling-down works; otherwise, be as careful as you may, there is great risk of further spreading the disease. No doubt an absolutely reliable serum for inoculating purposes will be discovered in the near future, but until that time arrives the most drastic measures are a necessity.

In connection with the intensive management of a comparatively small ewe flock every effort should be made to save the orphan lambs by "mothering" them on to ewes whose lambs have died. This is easily done by skinning the dead lamb and fastening the skin on the one which it is desired to "mother."

If, as is sometimes the case, a ewe persistently refuses to adopt a lamb, it is a good plan to have a dog in the neighbourhood, because the instinct of the ewe will induce her to become the lamb's protector and thus improve the relations between the two. Occasionally it is necessary to put a lamb to a ewe which already has one of her own, and this requires considerably more patience and tact. The ewe should be penned in such a position as will make it impossible for her to butt the lamb, and the lambs when not suckling should be kept close together in a box, so that the odour of the one may be imparted to the other. The easiest way, however, is to have the orphan lamb at hand, and immediately a single lamb is born the effluent, which is the result of parturition, should be rubbed on it. The lamb should have its legs tied and be placed in front of the ewe for her to lick, her own lamb being kept in the background in the meantime. A few small pens roughly erected with hurdles and straw are a great convenience in the lambing-paddock.

When grass is scarce nothing is better for flushing the milk than mangels, and, later on, a newly-laid-down pasture.

As a rule, when the presentation is normal, assistance is unnecessary, and the practised eye will soon see when the ewe is in difficulties, when immediate and gentle assistance should be given.

Before operating, the shepherd should wash his hands in some antiseptic solution, and his nails should be cut as close as possible. The breed of ram has a great deal to do with the difficulty or otherwise in lambing. Some breeds have very large heads, in which case, even when the presentation is normal, a young fit ewe will often become exhausted by the time the head is ejected, and the rest required before further effort can be made often results in the strangulation of the lamb. A careful shepherd will guard against this by constant watchfulness. The most difficult and unpleasant operation is to remove the dead, and sometimes decayed, lamb. This requires considerable skill and patience, and although force is an occasional necessity it should be avoided as far as possible. As soon as this operation is successfully accomplished the ewe should be well washed out and a mild aperient given, and if she is enclosed in a pen, do not forget to supply her with drinking-water.

Cultivation Work.

Ploughing, when weather admits, will still be in progress, and when the soil is of a light nature and intended for a lucerne or root crop it will be of benefit to give it an occasional stir up with a good strong cultivator. This operation will not only kill many weeds which are now making their appearance, but will also make the land more spongy and in a condition to store great reserves of moisture.

Hardy forage crops, such as tares and chou moellier, may be sown for early summer feed. The latter should be sown in rows 27 in. to 30 in. wide, at the rate of 2 lb. of seed per acre, and the plants singled out to 2 ft. apart in the rows. By this system a weight of 50 tons per acre may be reached on good soil. Western Wolths grass may also be sown. At Ruakura one paddock was sown with this grass as a catch-crop after oats, and although the land is exceptionally poor and the crop only a moderate one, excellent results have been had by grazing stud hoggets on it. It has been fed off three times, and is being ploughed in preparation for a rape crop.

For early fat lambs rape may be sown on dry land about the end of the month, and for such early sowing the ridger is a

great boon, because there is no danger of the young plants being flooded out, as is often the case after level sowing.

The rows at this station are made 27 in. apart, and the seed sown at the rate of 3 lb. of rape and 4 oz. of mustard. In preparing for this crop the land should be well ploughed and cultivated (a fine tilth being a necessity), and rolled just previous to ridging. It is not good practice to roll the ridges except the soil is of a very light nature.

For fattening lambs rape is invaluable. As manure for this crop I have found at Ruakura 3 cwt. of basic superphosphate gives excellent results; and for chou moellier, which is a surface-rooting plant and a gross feeder, 3 cwt. of basic superphosphate and 2 cwt. of bonedust per acre. Many farmers are great believers in blood and bone, but at this farm, when applied to root and forage crops, it has invariably given the poorest results, "no manure" excepted.

All potatoes which have been stored in shallow boxes for seed should be carefully gone over, and diseased tubers, or those showing "thready" sprouts, removed.

Early-sown cereals should be fed off as soon as sufficiently grown, taking care that this is not done when the land is very wet.

Where turnips have been fed off the land should be lightly ploughed if intended for a cereal crop; in some instances discing will suffice, as it is not good policy to bury the sheep-droppings too deeply, particularly when the crop to follow is barley, as this is of shallow rooting habit.

Three-year-old draught horses should now be broken in so that they may take a limited share in the spring work.

THE ORCHARD.

W. A. BOUCHER.

PLANTING.

USUALLY during the month of August many favourable opportunities will occur for the planting of orchard lands—in fact, the climatic conditions generally prevailing during this month make it possible to complete the final preparation of the land under the best conditions. It has previously been mentioned that at the time of planting the soil should be in a moist and friable condition. Especially in the case of clay soils is it desirable to avoid either working the land or planting the trees when the soil is cold and wet, and

also surface soil should be used for filling in when planting the trees, and not the earth that has been taken out when digging the holes. Attention should be given first to classes of fruits that bud and blossom early, such as peaches and Japanese plums, and later to other classes of fruits which remain dormant for a longer period.

Pruning.

This very important feature of orchard work should never be overlooked. Trees left for a season or two unpruned can be brought into suitable shape again only with some difficulty and loss of crop.

Nursery Stock for Planting.

As a considerable amount of planting will be carried out during the month of August, it may be as well to remind orchardists that nursery trees require careful attention before planting.

In the past it has been no uncommon practice to plant trees just as they have been received from the nursery, without top or root pruning. When lifting from the nursery rows it is the general custom everywhere to cut the roots with a spade or other implement so that the trees may be removed for despatch to their destination. The result is that the roots so cut are more or less bruised or broken.

To plant trees with the roots in such a condition is altogether unwise. Although they may survive then, they will not recover from the effects of transplanting as readily as if the roots received the further attention necessary. This will consist of carefully cutting off all bruised or broken ends with a sharp knife or pruning-shears. After planting, the tops of the young trees should be cut well back—in fact, the branch crown should not be more than knee-high.

Cultivation.

As the soil becomes comparatively dry with the warmer weather and longer days of the approaching spring, cultivation will be required to control the growth of weeds and grass. Ploughing should be followed by harrowing, and later the cultivator will be found useful for the purpose of keeping the soil well stirred.

Spraying Peaches and Nectarines.

For control of fungus diseases attacking the peach and nectarine some growers realize that it is wise to spray as soon as possible after the leaves have fallen, and again in the spring when the buds have commenced to swell. Others, however, trust to a single spraying to effect this purpose. If successful results are to be

looked for, in no case should the necessary treatment be overlooked, otherwise the trees may suffer such serious injury, especially from attack by die-back fungus (*Clasterosporium carpophilum*), as to interfere with their growth and production for some years. Spray the trees thoroughly, and especially the previous season's growth, with the Bordeaux mixture—10-10-40 formula.

Apples and Pears.

It is noticeable in some districts since the red oil has been adopted as a spray for the control of mussel scale, red spider, &c., that the use of the Bordeaux mixture in autumn and spring for the control of black-spot has come to be regarded as unnecessary. This must be looked upon as a great mistake, for neglect of the use of the Bordeaux mixture, winter formula, very much increases the difficulty of controlling attacks by these fungus diseases later in the season. Although infection cannot be entirely prevented, yet it has been proved that the application of the winter Bordeaux considerably lessens the liability of serious infection, with the consequent severe blemishing of the fruit and such infection as may, on examination by a Fruit Inspector, ensure rejection of consignments either for export or for the local markets.

Mussel Scale and Red Mite.

In many localities it will not yet be too late in the season to spray for mussel scale and red mite. For the control of these pests red oil emulsified is of proved value; but it must not be forgotten that the quality of the oil is of first importance if satisfactory results are to be obtained. Also, it may be as well to remind growers that the red oil should be applied only when the trees are quite dormant. Should the oil be used after the buds have commenced to swell the results would probably be altogether disastrous.

Cherry-leaf Scorch (*Gnomonia crythiostoma*).

Those who are interested in the production of cherries, whether for commercial purposes or domestic use, are advised to spray their trees with the Bordeaux mixture (winter formula) when the buds have commenced to swell, in order to protect them against attacks by leaf-scorch. The result of severe infection by this fungus is the almost entire defoliation about midsummer, checking the growth, and in some cases even causing the death of the trees.

Lemons.

The fruit of the lemon is liable to infection by verrucosis and grey scab. Either of these fungus diseases will cause unsightly

blemishes, which will render the fruit almost unmarketable, or, at any rate, reduce the market value very considerably. As soon as the main crop has been gathered spray with Bordeaux mixture—4-5-50 formula.

Specimens of leaves and fruit thickly coated with a black smut or fungus are frequently received with inquiries as to the cause. This will be found in the presence on the trees of sucking insects of various kinds, especially black scale, by which lemons are almost invariably attacked. These insects excrete a sticky liquid called honey-dew, which adheres to the wood, leaves, and fruit, forming a suitable medium for the growth of the black fungus. In order to destroy both the scale and the fungus spray with kerosene emulsion[1]

STRAWBERRIES.

Strawberry-plants are almost invariably attacked by leaf-spot to a greater or less degree. Spray with the Bordeaux mixture—4-5-50 formula—in order to protect the foliage as far as possible.

AMERICAN STANDARD APPLE-CASE.

A Bill has been introduced in the United States House of Representatives, and has been favourably reported on by a House Committee, providing for a standard apple-box for the whole of the States. The dimensions are as follow Depth of end, 10½ in.; width of end, 11½ in.; length of box, 18 in.; representing 2,173½ cubic inches. Boxes not measuring up to the standard must be marked "short box."—*E. Clifton.*

The measurements of the apple-case recommended by the Department for New Zealand growers are: Depth of end, 10½ in.; width of end, 12 in.; length of box, 21½ in., or 2,709 cubic inches. This case holds an imperial bushel of apples.

THE VINEHOUSE.

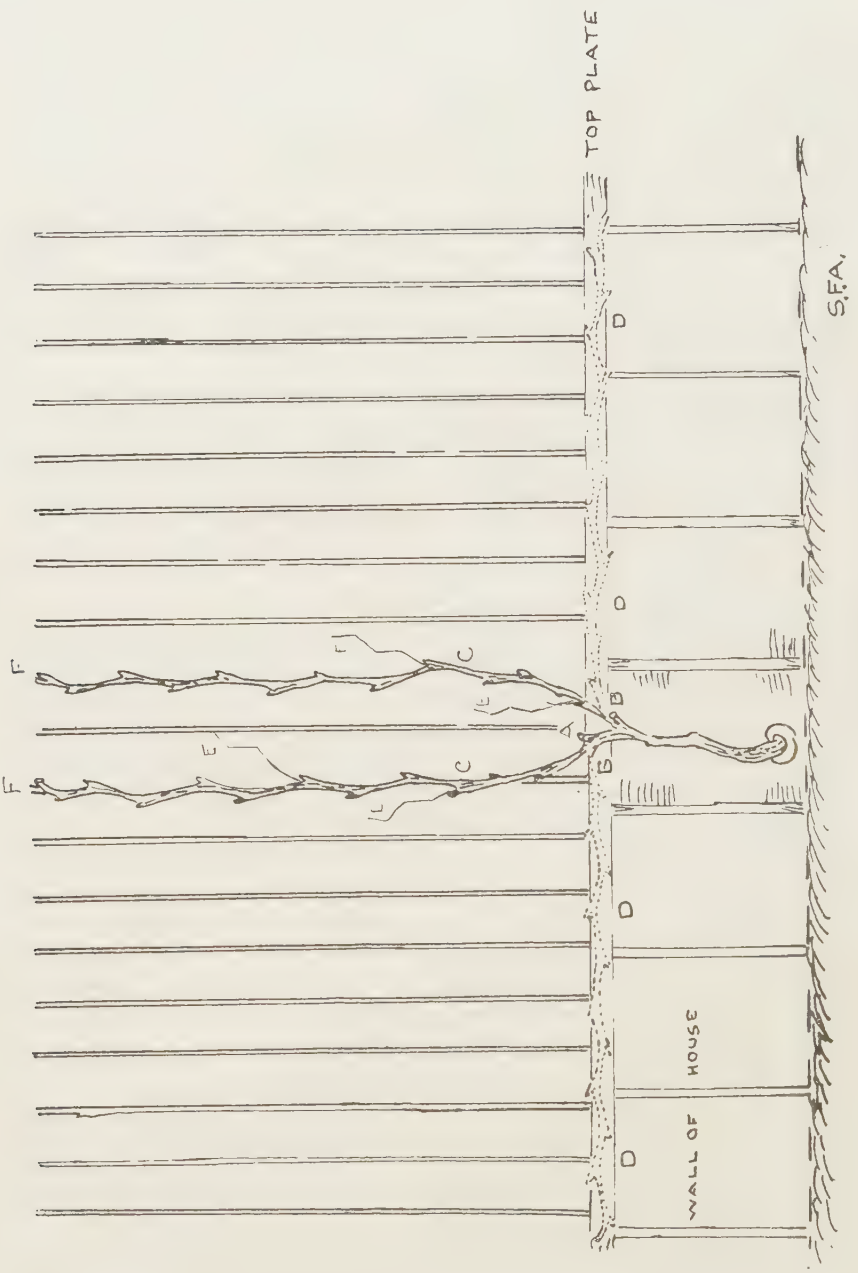
S. F. ANDERSON.

TO TRAIN A VINE UNDER GLASS.

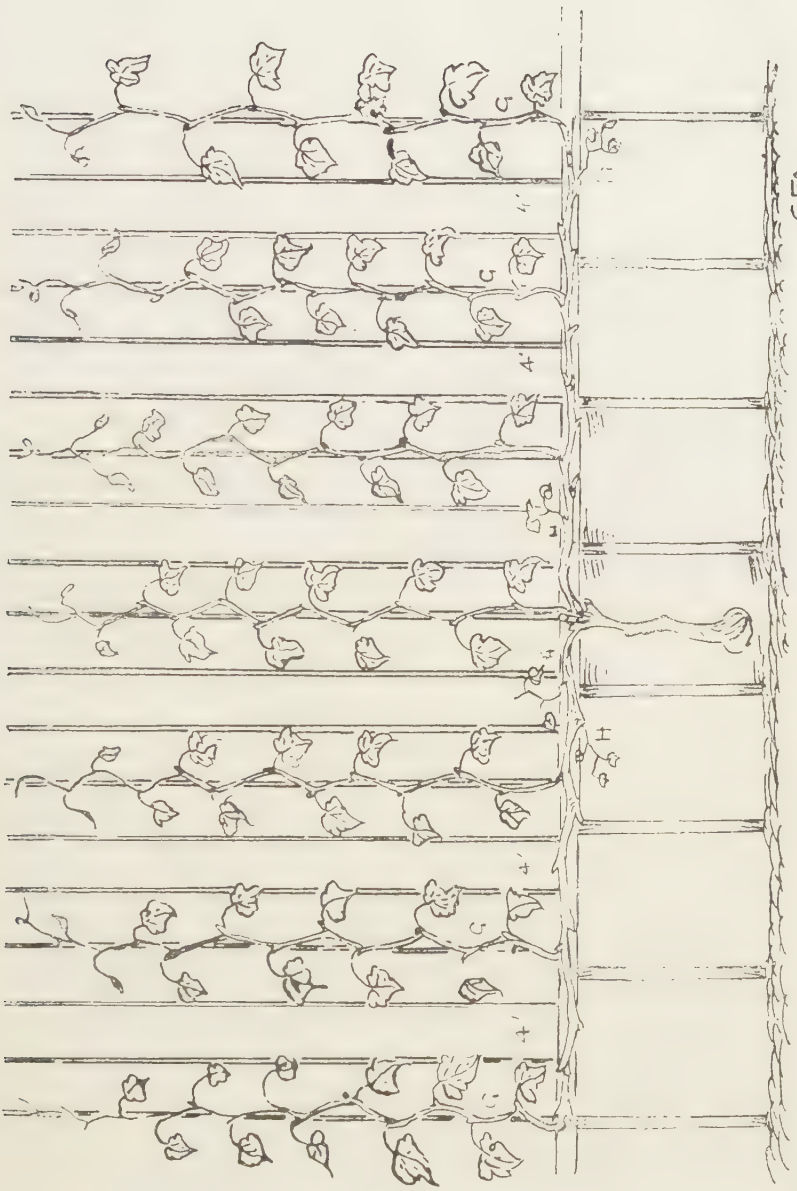
WHEN planting vines for a house it is the general custom to put a vine for each rod or fruit-stem required. The object in doing this is principally to get a quick return. A vine so planted and trained can yield in four years a crop of fruit, but where it is trained to grow a number of rods it requires a longer time to develop these into full bearing. It is quite within the power of a single vine to support many permanent bearing-

rods. The only thing necessary is sufficient time in which to develop them, just the same as in growing a large tree. Take, for instance, a house 50 ft. or so long. One vine could be trained to fill up the whole of one side of the house if required, so that two could be made to fill the house. The training in this case would require to be somewhat on the following lines, assuming that we are starting with a fairly strong plant—say, four years from the planting. It matters not whether it has been brought in through the wall of the house or has been grown inside. If four years old, the wood of the stem will be fairly strong. Before cutting back as shown on sketch at A see that below where it is cut back there are at least two good starting-places for the new rods (at BB). When the growth in spring starts from these two places (BB) it should be trained up the wires in the ordinary way, as shown by CC. The main thing, however, is to confine the vigour of the vine in producing these two strong rods. Side shoots will start out from these and from other parts (see EE). These should not be broken out but merely pinched in, to prevent their taking the lead of the rods. If a few bunches of grapes come on they may be left to mature, as they will not interfere with growth in a vine of this age. The more foliage allowed the better, provided the shoots bearing it are kept within reasonable bounds, because it is on the number of leaves a plant has that its vigour depends. With good training and management these two rods may grow—after the terminal points have been cut back (in the winter) to FF, where the joints are strong and regular—to 12 ft. in length. In the winter, after the side shoots have been pruned, the two new rods (CC) may be laid down horizontal with the top wall-plate of the house, as shown by the dotted lines at DDDD. With rods 12 ft. in length extending each way we have 24 ft. of the house provided for. These now form the base for bringing the permanent fruiting-rods, as shown in sketch No. 2. Coming back to where the first-mentioned rods are laid horizontally, these are now divided into six spaces of about 4 ft. each (see sketch No. 2). If we obtain a rod from the bud of each end of these horizontal rods we have seven rods to train up the wires as they grow. As a growth will start from every bud, those at the distances mentioned above (GG) (every 4 ft.) are to be encouraged, and the ones coming between them (HH) rubbed off. It now becomes a matter of training these new shoots up the wires to form permanent rods in the same way as is done with those at CC, sketch No. 1.

The remainder of the side may be dealt with in the same way by laying down the two end rods when grown to the extreme



SKETCH NO. 1.



SKETCH NO. 2.

ends of the house, and further rods trained upwards as before. It will, of course, be realized by the grower, even when starting a strong four-year-old vine, that filling a house with rods in this way takes time. For instance, we start with a vine four years old. The first year is taken up with growing the rods for laying down; the second year the shoots that are to be trained up from the horizontal rod may not be good enough to retain, as we have called on the vine for over a threefold increase. They will then require cutting back to the horizontal base rod and starting again. The management of growing these is exactly similar to the first two. It is no use retaining weakly rods; if weak and short-jointed cut back in the winter and get new ones. The third year has come before this stage is reached. The fifth year should see 24ft. of the house with a fair (not full) crop of fruit from one vine, and a further three years will be required to fill the remaining portion of the house in the same way. It will be seen how this method of training can be made to suit the replacing of vines that have been taken out or have died, by first extending a horizontal rod and then growing others up from it. Where a single vine is being grown in the above manner it must have a large and well-fed border.

THE VINEYARD.

S. F. ANDERSON.

THE pruning of outdoor vines will now be in full swing. The best time for doing this is July and August. If a large area has to be done with few hands it can be commenced a little sooner, but finished not later than the first week in September. It does not matter much with the varieties being grown in this Dominion in what order they come. Black Hamburgh may come first and the Cabernet Sauvignon last. The American varieties should not be left late: about the beginning of August would be the best time for them. See that the pruning is closely followed by the removal from the espalier fences of prunings, and ties of raffia, flax, or osiers cleared from the wires. It looks very untidy to see these left year after year hanging to the wires, beside harbouring spores of disease and eggs of insects.

The pruning should be immediately followed by the winter spraying with the Bordeaux mixture, using the winter formula—

10 lb. sulphate of copper, 10 lb. of fresh roche-lime, and 40 gallons of water. This winter spray should be applied to all outdoor-grown vines wherever grown in the Dominion. Its application must be thorough. Every part of the stem and rods should show the result, therefore put a reliable man on the job. Too much of the spraying is done imperfectly. Do both sides, above and below. The cost of doing it thoroughly is not necessarily greater, but the result of doing it carelessly is unsatisfactory because it is then more or less ineffective.

THE POULTRY-YARD.

F. C. Brown.

Current Problems.

The incubators should be "going at top" during August, especially where the stock being bred are of the heavier types. Early-hatched birds are invariably the more profitable; indeed, some breeders contend that June is not too early to commence hatching White Leghorns, as these will then lay about December, and after laying for three or four months will go into a short moult and then lay right on till the following autumn. Experience, however, differs as to the duration of the first short moult referred to. For the ordinary breeder I advise leaving the hatching of White Leghorns till September, but having all clucks of the heavier breeds in the brooder by the end of August.

I cannot emphasize too strongly the importance of having brooders thoroughly clean and the runs fresh. With the natural mother it is imperative when the chicks are hatched that the coop should be placed on fresh ground and be constantly moved about, so that the conditions for the young ones may be as perfect as possible. With all young developing life cleanliness is imperative. Care should be taken to see that the natural mother is quite free from vermin, and that the coop is in a thoroughly sanitary state. A poultryman complained to me the other day that his hens would not sit satisfactorily, leaving the eggs when these were only about half hatched. When I saw the conditions I was not surprised. The nests were in dark unhealthy quarters adjoining a fowlhouse which was overrun with red mite. A hen cannot hatch out chicks if she is a prey to vermin. Apart from

this, chickens hatched under such conditions are handicapped for life. How very often one hears of the good hatches a hen will bring out when she makes her own nest in some secluded corner under natural conditions. It is not to be wondered at, as she chooses the very best conditions, and generally has not to contend against the annoyance of parasitic life. Where sitting-hens are placed under fairly natural conditions and are given every opportunity to rear their young in comfort equally good results should be obtained. In rearing the incubator-hatched chick it should be remembered that the attendant must largely take the place of the natural mother. He should keep a constant eye on the chicks and endeavour to anticipate their requirements, not waiting to adopt preventive measures for some trouble till the little ones become so badly affected that they are possibly not worth the rearing. The profitable bird must not receive a check from the day the egg is placed in the machine. Chicken-rearing is not a thing to make experiments with. The novice should not rely entirely on theoretical knowledge, or even the practical advice of a sound poultryman, but should study out things for himself. For instance, where artificial incubation is being taken up for the first time or a new make of incubator is being tried, it would be well to test the machine with a few eggs before the practical work is entered upon. A simple practical test like this will be most instructive, while it may save much subsequent loss and discouragement.

SELECTING THE BREEDER.

I have seen so many undesirable male birds selected to head a breeding-pen that a few words in regard to selecting the sire may prove useful. As very many poultrymen have not that keen eye for form which is one of the most valued possessions of the successful breeder, it will serve my purpose to enlarge upon one detail in the work of selection— a detail, however, which is the best index of breeding-power. I refer to the head-piece. Very seldom indeed will it be found that a bird with a fine head has a body which hardly pleases the eye, but even so I would prefer such a bird to one with a distinctly weak head but having a rather better body. There is no safer indication of constitutional vigour than the head, and constitutional vigour is the first requirement in the breeding-pen rooster—that is, of course, given that the bird is of the desired laying-blood. The head should be masculine in every respect, but this should not imply coarseness. The two heads illustrated, Black Orpington cockerels of the same age and from the same pen, demonstrate better than any explanation I may make the vast difference in

heads and the strong contrast there is between the true male head and the feminine type of head it is possible to get on a rooster. The very expression of the masculine head is a clear index of the possession of constitutional vigour, while the weak sluggish expression of the feminine head indicates a bird which will reduce the quality of the stock, from both vigour and productive view-points, rather than advance it. Of course, there are other indications suggestive of the desired type, such as chest-

THE STRONG HEAD.

THE WEAK HEAD.

development, width across the saddle, depth through the body (especially through the abdomen), width between the legs, the quality of the legs themselves, tight feathering, and generally an alert, bold carriage. All these things tell, but the head is the mirror of the animal. I have invariably noticed that the cock bird with a great headpiece (I am not speaking of the useless comb, wattle, and such fancy appendages) is able to last out without going off colour show after show, whereas the bird with the weak head (and the knocked knees, which are a usual accompaniment) has a washed-out appearance at the second time of showing.

TREATMENT OF THE BREEDERS.

An essential in the breeding of profitable stock is in not only having the right class of parents, but in handling these to the very best advantage at mating-time. Especially should the rooster—primarily a vigorous bird from a heavy-laying strain—be in the very pink of condition when placed in the breeding-pen. For some time prior to this the rooster should be kept by himself under the best conditions, having decent roosting-quarters,

a fair range, and plain nourishing food, of which green stuff is an essential requirement. The vigour of the sire should be conserved in every possible way. So with the hens, which should never be placed in the breeding-pen immediately on the conclusion of a heavy and forced laying-period.

HOUSES.

There is a general failure to appreciate the breathing-space necessary for the individual fowl in providing roosting and exercising quarters. It may be taken as a general rule that nothing less than 4 square feet of floor-space (to be ascertained by multiplying the length by the width) should be provided. In making the perches, 7 in. at least should be allowed for light breeds and 8 in. for the heavier breeds. During cold weather the birds may roost on less space than this, but during the warmer parts of the year they will be inclined to spread out, and then even the measurements given will be hardly sufficient for their natural requirements. An open-fronted house in which it is intended to confine the heavy layers during winter should be from 14 ft. to 16 ft. deep, preferably the latter. The floor of the poultry-house should be formed in such a manner that the birds may have a thoroughly dry footing even in the coldest months of the year. It should be higher than the surrounding ground, and should, if possible, have a damp-proof covering. There is probably no better floor than rammed clay covered with tar and sand. Concrete is an admirable flooring-material, though this is apt to be rather cold in winter in the colder latitudes. Whatever the floor is made of it should be elevated above the surrounding earth, so that it may be as dry as possible. In providing housing-accommodation beware of overcrowding, a mistake which is often disastrous in its consequences. When the floor is hard the perches should not be elevated higher than 15 in. Especially in the case of heavy birds the alighting from a high-set perch on to a hard floor is apt to cause corns and deformed feet.

THINGS TO REMEMBER.

Beware of overcrowding, especially in the brooder.

Small runs are less objectionable where the soil is of a light character than where it is of a heavy or clayey nature.

Breeding from a male having feminine characters is generally followed by disappointment.

Prepare accommodation for additional stock to be reared this season well ahead.

Strong chicks cannot be expected unless the parents have had ample exercise.

Forcing the breeders for egg-production is generally followed by poor fertility of eggs, bad hatches, and loss of chickens at the brooder stage.

If many dead germs are being found on testing the incubator eggs, either the management of the incubator is wrong or the breeding-pen is not what it should be.

THE APIARY.

F. A. Jacobsen.

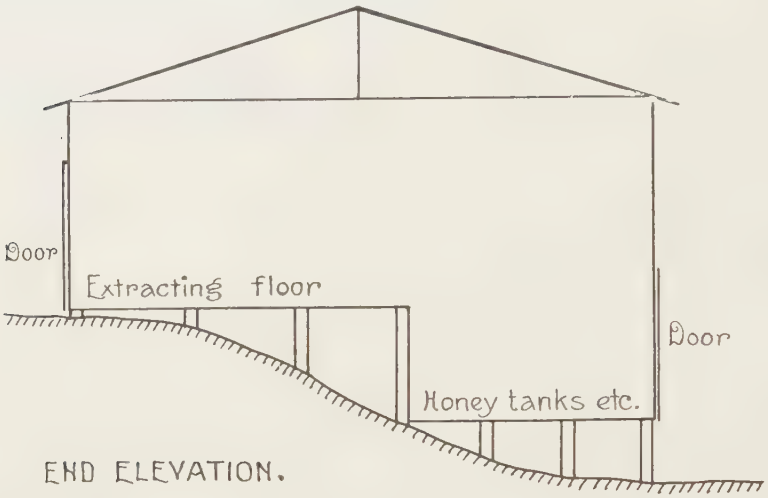
Apiary Buildings.

While on my rounds doing inspection and instruction work I have often been surprised to find beekeepers working under difficulties, owing to restricted accommodation in extracting-houses and workshops. I have frequently pointed out that every facility must be provided to expedite work and make this effective. In a number of cases, I am glad to say, improvements are being effected. This is the time of year when the necessary buildings should be erected.

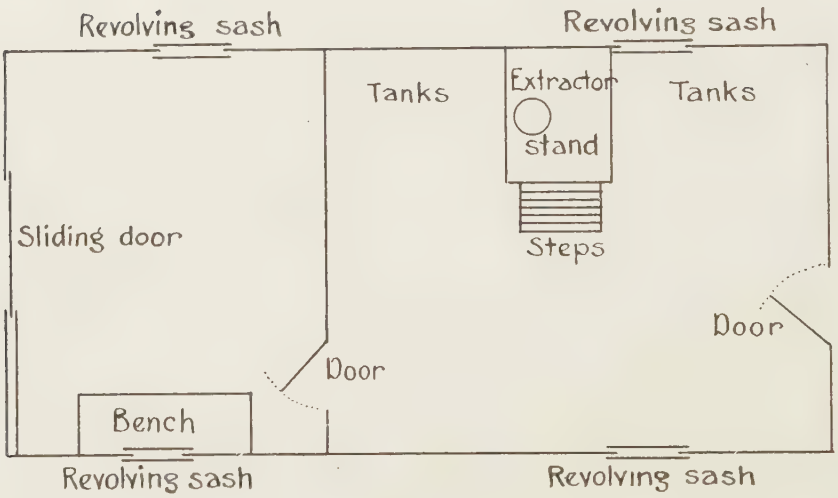
Where there is only one apiary an extracting-house together with a workshop is required; but where one man owns several apiaries he must have a central depot. The depot should contain an up-to-date workshop fitted with machinery for making hives and for driving a foundation-mill. It must be of sufficient dimensions to leave ample storage-room for the crop. The man with one apiary, however, requires something on a smaller scale.

The first consideration is a site for the house. The ground in many cases will lend itself to the erection of a plant whereby the honey may be manipulated on the gravitation system — the most economical way of handling honey. The house is built on the side of a hill, and the extracting-floor is about 6 ft. above the lower floor, where the tanks are placed. The honey runs direct from the extractor into the strainers above the tanks. The sketch will plainly illustrate what is meant. By this method no lifting of honey is involved.

Where the formation of the ground does not permit of a building of this description one of simpler construction will be necessary. The size would require to be 30 ft. by 15 ft., which would allow ample room for the working of an apiary of from seventy-five



END ELEVATION.



to one hundred and fifty colonies. It should contain two rooms on the one floor, one for extracting the honey and putting it into market form, and the other for use as a workshop. The ground floor would be on the principle as indicated in the sketch.

The platform for the extractor is usually built about 4 ft. high and 6 ft. by 4 ft. on top. This is for convenience in handling the honey, and to enable it to gravitate to the tanks below.

A later and more convenient method, however, is to dispense with the platform altogether and use the honey-pump in its place. The pump can only be used by those who have power for extracting, but every beekeeper with a hundred colonies or more should have a small engine.

A splendid photograph showing how an extracting-house should be arranged, with honey-pump and power-driven extractor, was shown in the February issue of the *Journal* for 1914. These pumps are very popular with American beekeepers.

One of the chief points to observe when building an extracting-house is to make it bee-tight. The windows should be built either with a revolving sash or they should be screened with gauze, with a bee-escape at the top. Bees when liberated in a room always fly to a window, hence the necessity of a "Porter" bee-escape being fitted, which will enable the bees to get away, but will not permit them to enter again. An escape even better than the Porter can be made by simply running the gauze about 6 in. above the top of the window, on the outside, and $\frac{1}{4}$ in. from the wall.

The windows will require to be kept open during extracting to enable the bees to get away.

It is of great importance to select dry timber for the building, to guard against shrinking, and so leaving places where the bees may enter during the robbing season.

THE GARDEN.

W. H. TAYLOR.

VEGETABLE-CULTURE.

ONIONS.—The kind of soil on which onions are grown is of less importance than the way in which the soil is treated. It is possible to grow good onions on almost any kind of soil when this receives proper treatment. Good drainage should be secured, although not necessarily by underdraining. Some of the best onions I have seen were grown on a natural bog in a deep hollow, where sunshine

was of minimum duration, and I may say that strawberries also flourished there. The only draining done was by open trenches, which lowered the water but did not drain the soil to any depth. I also saw in the same place a pound of onion-seed put in and none grew. On that occasion they were sown too early for the situation. They were sown according to calendar time, which is not a guide to be followed in all circumstances. Heavy clay soil is about the worst to deal with in onion-growing, but it will produce onions as good as any soil when the grower works for it. The best of all soil for the purpose is sandy loam, and if it is of fair depth and drained, either naturally or artificially, it will usually give the brightest-skinned onions and with the smallest possible outlay of labour. Heavy soil should have humus added on every possible occasion. Nothing is better than stable manure, but on no account put cow manure on it; the latter would make it heavier. After being dug over and treated to as much manure as can be worked in or spared to it, heavy soil should lie undisturbed until dried by sun and wind. On no account work it when wet from recent rains, but before the lumps become really dry after rain will be the best time to break them down. This is to be done with the least possible amount of trampling. If there is a heap of ashes and burnt earth in reserve, give a good surfacing of this, and it will be easy to get a surface fit for sowing the seed. The drills should be just deep enough to allow of covering the seed, which means as shallow as it is possible to draw them. After the plants are up the surface must be kept loose. After every heavy rain, but not until the surface has dried somewhat, the soil between the rows should be loosened—not deeply, but just enough to prevent a crust forming. A sharp-toothed rake or round-tined manure-drag will do the work well. The workman should walk backwards so as not to tread on the loosened soil. When thinning is finished a thin mulch of littery manure will assist in keeping the surface loose, and will in other ways promote healthy growth. Soil that is naturally free is better worked with a flat hoe, which will move only an inch or so of the surface soil. The state of soil to aim for at all times is firmness with a loose surface. Just as a loose surface helps growth in the case of onions, so it does with all other plants. The principle should, in fact, be applied to all growing crops. Not infrequently plants lag in growth for no other reason than want of cultivation. Air, but in less abundance, is just as necessary to the roots of a plant as to the tops. Air cannot penetrate with sufficient freedom through a closed-up surface, still less in waterlogged soil.

Lettuce seed should be sown now about once a month, and *radish* every ten days. Only a comparatively small sowing of each will be wanted.

Turnips may be sown as soon as August is in.

Early Horn carrot should be sown, if not already in. It is best to sow only sufficient to last till midsummer, for the main crop should not be put in for several months yet, the object being to sow at such a time as will allow of good development of roots before winter. They should not, however, have gained a large size until autumn, as they will then be in a tender state for winter use, and will last until the following August.

Peas should be sown now at intervals of two weeks until the end of the year. Cease now to sow dwarfs, and substitute varieties that grow more or less tall, according to the treatment that can be afforded. It is not wise to grow really tall kinds unless sticks can be afforded. Certain it is that wherever sticks can be obtained it pays to use them for varieties of only moderate height. The best peas are obtained only from rows so supported. The haulm being clear of the ground, the pods develop better and are not injured by slugs. In the early part of the season it is quite impossible to clear the place of slugs when the pea-haulm lies on the ground, and from the peas they travel to adjoining lines of seedlings, and either work havoc or give the gardener a lot of night-work liming them.

If *cauliflowers* and *cabbages* have not been planted, the sooner this work is done the better, or the first supply will be late. Both require rich ground. Blood manure is very useful for these crops. It becomes available for the roots as soon as there has been a good fall of rain, as it dissolves immediately.

Rhubarb may still be planted on lines previously laid down.

Asparagus on old-fashioned beds should have had a heavy dressing of manure given several months ago, as advised. Before the manure was applied the surface soil was stripped off and left along the sides of the beds. This soil should now be returned, being thrown up on top of the manure, which will have shrunk down considerably. When the soil has been replaced give a dressing of salt at the rate of 4 oz. to the square yard. This will serve first of all to kill slugs, &c., and weeds, and later on, as it gets washed down, it will feed the plants. If the asparagus is planted according to the modern plan—viz., in rows on the flat, and manure placed on it—the treatment now required will be different. The rough parts of the manure remaining should be cleared away and the soil be very lightly forked over. Salt should be given as for

the other style of bed. Wood-ashes are a very fine fertilizer for asparagus and, if available, may be liberally applied. If the supply of manure were not plentiful, bonemeal may be given. The best way to apply it is mixed with wood-ashes or road-grit, or a mixture of both, a 6 in. potful of bonemeal to each barrowload, the mixture to be put on 2 in. or 3 in. thick. Asparagus cannot be overmanured. Any one near the seaside may manure with kelp; it is good for asparagus, but has proved to be no better than other manures.

Garlic and *shallots* should have been planted before. It is not yet, however, too late to do so. These bulbs require a very free soil. They should not be planted deeply. Merely press them into the surface, leaving the tops visible. Put in the cloves about 10 in. apart in rows a foot asunder.

Parsley may be sown, and *thyme* may be divided and replanted. It is best to do this every second year, or the growth becomes straggling and woody. *Sage* and *winter savory* may be treated in the same way. These herbs root easily from cuttings of young shoots in a warm somewhat shaded spot, with more certainty in pots or boxes in a frame. Either is easily raised from seed.

Early potatoes may be planted. Sprouted sets should be used, being safer if a spell of wet weather should ensue. Choose a comparatively dry spot, with free well-worked soil for the early crop. A small piece should be cut from each set to ensure decay. A little soot put in around each set will shield them from wire-worms and slugs. Whole sets of small size are best; about as large as a hen's egg is a good size. The quality of the sprout is of more importance than the size of the tuber. The sprout should be firm and plump, and firmly attached to the tuber.

SMALL FRUIT.

Strawberries can be very successfully grown in a garden-plot under conditions that would be very unfavourable to large plantations. When operations are large it is absolutely necessary to reduce labour to the minimum. In a garden a little extra labour on a small patch does not amount to much, and this enables better results to be secured the first year than can be reasonably expected where less trouble is taken. On a former occasion I advised in these circumstances delaying the final planting until spring. On some soils this might not give any great advantage. Yet there are advantages on any soils, but it is on strong soil the advantages are greatest. For it enables the grower to work over

the soil as often as necessary to get it in good condition or to keep it so, and when planting is done the soil is in good condition and free from weeds; whereas if such soil were planted in autumn, the plants lying dormant through winter, it is liable to be in bad heart in spring and weedy, and weeds in such conditions are difficult to deal with. But merely delaying the planting will be of little use unless the plants have in the meantime been treated as I advised. If that has been done they are now fine well-rooted plants, and should be lifted each with a good ball of soil, and planted carefully with as little delay between lifting and planting as possible. Now is the time to plant. It is likely that they will be more or less in blossom; they will not be injured, and should produce a good crop of fine fruit.

Gooseberries, currants, raspberries, and *loganberries* should be planted at once, if not already out. Gooseberries should be sprayed with 10-10-40 Bordeaux mixture to prevent leaf-spot, which is a very destructive disease easily controlled by this means.

FLOWER-CULTURE.

Sweet peas, if sown in autumn, will now be in strong growth. When they are grown for show purposes some sacrifice in number of blooms has to be made so as to secure high quality and size. Growers for show have the plants about a foot apart, and even limit the number of branches each plant carries. The plants break naturally into a number of branches, and these are usually limited to three. When grown for garden decoration or for use in the house it is not necessary to do this. The work should be done according to the dictates of individual taste. Some prefer a gorgeous mass of beautiful flowers to a lesser display of a higher order of excellence as regards individual flowers. In such cases there is no need to thin the branches or to have the plants so far apart. It is advisable to give some kind of fertilizer at this time, for the soil is likely to be to some extent exhausted. Soot is useful both as a fertilizer and to keep insects in check, and may well be used occasionally. There are special fertilizers prepared especially for sweet peas that may be obtained from any seedsman.

Dahlias that have not been lifted from where they grew in the past season should be taken up now—at least, it is usually best to do so, and almost necessary if fine flowers are desired, though in some cases it may be quite satisfactory to leave them alone. If the tuber is not disturbed, growth starts early and flowers come long before they do on plants newly put out. In some positions

such as well back in borders, it is useful to leave them in this way. They bear too many flowers for these to be very fine, but the numbers make a fine show. To produce good flowers there must not be many shoots; and, in addition to the opportunity lifting affords for digging the ground in a thorough manner, they are taken up so that the tuber may be divided into small pieces. One or two buds are all that are wanted on a divided piece, but it is not always possible to see the buds early in the season. The old tuber should be cut in pieces, not pulled apart, for if pulled the pieces of tuber are prone to break away from the neck, and then they are useless, for the new shoots come from the neck — that is, the part where the separate tubers, or, as they are often called, "potatoes," meet. The potatoes are at this time of no value to the plant, except that they keep life in the neck, which without them would dry up. The neck is the all-important part, and division should be made with a strong and sharp knife, taking a good piece of neck with each division. When the division is made the pieces should be heeled in in a dryish place in free soil in such a manner as just to cover them up. It is important to cover them, because if slugs, snails, or woodlice get at them they eat the neck away, or, rather, the outside of it, and then there will be no growth. Sometimes the tubers are stored under trees or hedges without covering them, and left there until the buds break, but the practice is attended with considerable risk.

Sowing Seeds of Half-hardy Plants.—This will be a busy time with this class of work. It is worth doing well. Careless methods lead to losses that are commonly attributed to bad seed, whereas it is rare that bad seed is sent out. There are, as a matter of fact, too many risks of losses in the manner indicated for the seedsman to be able to afford to contribute to them by selling bad seed. Many losses occur through too much watering before the seed has germinated. The seed may be lost through being disturbed just as it is germinating. Germination is certain only when no watering is done between the time of sowing and the appearance of the young plants, and if proper measures are taken it can usually be avoided. In the case of seed that is a long time germinating—and a few seeds are—careful watering will do no harm. It can be done in two ways, adopting the one most suitable to the circumstances. If the seed is in a pot or pan and watering becomes necessary, stand it in a vessel of water so filled that the water reaches to the rim of the pot or pan, but does not run over the top. Natural gravitation will cause the water to rise in the dry soil till it reaches its level. It will be seen coming through the surface of the soil. Then take the pot or pan

out. If the seeds are in a box this cannot be done. Lay a sheet of paper flat on the surface—it need not cover all the surface—and pour the water on the paper; then gently remove the paper. In this way there is no disturbance of soil. Boxes should not be deep—about 3½ in. in depth is ample. For handiness in working, all boxes should be of the same dimensions in every way. If the boards forming the bottom have crevices between them, it will be better for drainage than drilling holes. About half fill the box with littery stable manure, and press it down tight and level. Now fill the box right up with suitable soil, level it over with a strip of lath, then give a thorough watering. Leave it until all surplus water has drained off. Now put on a very little fresh compost, and press it down fairly firmly with a dry brick or piece of board. Scatter the seed evenly over the surface, and cover it by riddling a little fine compost over it. A very fine riddle must be used. I like one made with perforated zinc. If several kinds of seeds are to be sown in the same box, it is best to sow in little drills made with a pointed stick. Place the box in a frame or greenhouse, cover it with a sheet of newspaper, and cover that with a sheet of glass. Thus, evaporation will be prevented and sunlight kept out, and seldom will water be required until the plants are up.

Lilies may be planted now. They in almost all cases require to be worked deeply, and good soil is necessary if they are to give their best. Deep planting is necessary, partly because they have a set of roots where the stem parts from the bulb, and partly because they have a tendency to work up, caused by their natural mode of reproduction. Large bulbs of *Lilium auratum* should be in a hole nearly or quite 18 in. deep, thus being about 12 in. from the surface. Plant others at varying depths according to size, with the above as a guide. *Japanese iris* require strong rich soil or a naturally moist soil, in a position fully exposed to sunlight. Complete the planting of all herbaceous stuff as soon a possible, and planting of every sort according to circumstances. Plant now biennials sown in autumn, including dianthus, gaillardias, and such-like, and delphiniums and other perennials. Plant pansies in rich soil. The early flowers are the best of the year.

Population must increase rapidly, more rapidly than in former times, and ere long the most valuable of all arts will be the art of deriving a comfortable subsistence from the smallest area of soil.—*Abraham Lincoln.*

THE HEMP INDUSTRY.

W. H. Ferris.

Very little fibre is being produced at the present time. In only a few isolated cases are mills in operation, and these are hardly likely to benefit much by milling throughout the winter, as the attaining of a decent standard of quality is being found extremely difficult, owing to the failure to bleach the fibre properly by reason of adverse climatic conditions. Obviously it is too risky a procedure to attempt to bleach hemp in winter, when the minimum of sunlight and probably a maximum of moisture is experienced. Fair work can sometimes be done if great care be exercised, but then millers should not be afraid to clip the tails of the hanks well, as thereby better work can be done by the scutcher and a decent result will probably be secured. A number of lines milled in June had the rough "flaxy" tails left untouched, thus necessitating their being graded into "fair" grade, though the body of the fibre merited a "good fair" stamp.

Many millers, particularly those who have mixed leaf, would be well advised to make up their minds to grade, or sort, their leaf during the coming season. It should be remembered that the lowest quality often determines the grade of the whole line. Obviously the manufacturer will not purchase freely lines which are mixed and contain fibre of uneven lengths; indeed, some buyers will not touch such fibre even at a reduced price. It will always pay to sort inferior and short-length fibre separately, and send the two qualities forward branded by distinctive marks.

The main phormium swamps are in very good order at the present time and should yield a record quantity of good-quality fibre during the coming season, providing, of course, that a good standard is aimed at and that the various operations are carefully controlled.

The Whitanui Flax-mill Company is erecting an up-to-date mill at Tokomaru. This will probably be the finest in the country. It is being constructed of ferro-concrete, and will be equipped with the latest and most approved machinery and appliances.

Several millers have resumed operations, and some of these propose milling on an extended basis. The Miranui Company intend working nine strippers this season, which should enable 50 to 60 tons a week to be turned out.

The committee inquiring into improved systems of treating phormium-fibre competing for the Government bonus expects to conclude its investigations by the end of the present month.

THE FRUIT CROP.

THE officers of the Orchards, Gardens, and Apiaries Division report as follows on the condition of the fruit crop at the end of June :—

AUCKLAND NORTH.—Late varieties of apples are in fair supply at good prices. Planting is in full swing. Lemon-trees are doing well, and there is a good crop of Poor-man oranges. Peach and nectarine trees are looking well, and pruning is in hand.—*W. C. Thompson.*

AUCKLAND SOUTH.—Practically all apples have now been marketed, and, generally speaking, the season has been successful. The lemon crop is heavy, and the trees are looking well. In many cases peaches, apricots, and nectarines have already been sprayed with Bordeaux mixture, and growers of the earlier varieties of fruits are preparing for oil-spraying.—*N. R. Pierce.*

POVERTY BAY.—Very little fruit is now left except apples—principally Ballarat Seedling, which apple is an excellent keeper, vigorous grower, consistently heavy cropper, and in every way well suited to this district. A number of applications for pruning and spraying demonstrations have been received, and these will be given during the month. I have not yet been able to ascertain the full extent of the damage done to orchards by the recent floods, but hear that it is not as bad as was at first anticipated. One prominent grower, acting on previous bitter experience, commenced last year to erect an embankment round his property, which in the present flood assisted very greatly in keeping the water out.—*W. R. L. Williams.*

HAMILTON.—The weather during the month has been very changeable, alternating between wet squalls and hard frosts. Orchard work is proceeding steadily. Peach-pruning is well advanced, and ploughing has been done in many localities where the weather and soil conditions have been favourable for such work. Planting is going on in many places, principally in small domestic or farm orchards. Commercial planting is taking place in certain places, but not on a very extensive scale. Lemons are fairly plentiful in the Bay of Plenty. Growers are beginning to realize how profitable this fruit is becoming, consequently the old groves are receiving more attention now than formerly. Apples and pears are getting scarce on the markets. Prices are good.—*T. E. Rodda.*

HASTINGS.—Pruning, spraying, planting, and general orchard work are progressing favourably, and indications on the whole favour a good all-round crop for the coming season.—*J. A. Campbell.*

WANGANUI.—The favourable season just passed resulted not only in satisfactory crops of fruit, but also—what augurs well for the future—a good crop of well-ripened young wood and flower-buds. These are now receiving attention in the direction of pruning and spraying, there being a general advance towards up-to-date methods of performing these operations.—*W. C. Hyde.*

PALMERSTON NORTH.—Apple and pear crops have been very satisfactory, and growers are now turning their attention to winter work in the orchard. Already much pruning has been done in readiness for winter spraying.—*G. Stratford.*

WELLINGTON.—Cultivation and pruning are in progress, and there is every appearance that good spraying-work will be done. The season's crop and the prices realized were fair. Codlin-moth was well under control, but powdery mildew was prevalent last season owing to the large amount of wet weather experienced. Harder pruning may have to be resorted to this winter. There is every appearance of a rough and wet winter, and growers should watch for the fine days in which to spray, &c. Two large orchards are to be planted in my district next season.—*T. C. Webb, jun.*

NELSON.—The weather for the month has been seasonable—average rainfall and frosts, with bright sunny days. Growers are busy with pruning and spraying operations. Woolly aphis has been very persistent during the autumn, and many growers are using oil washes earlier than usual in consequence. Lime-sulphur is coming more into favour, and I expect to see a great deal of this used in spring in place of Bordeaux mixture. Heavy consignments of trees are being landed for

the planting season, which promises to be a record for the district. The export season to South America closed on the 16th June, 955 cases going forward, and bringing the total number shipped up to 48,001 cases. Stocks of choice apples are light, and pears are almost finished, with the exception of cool-stored fruit. A good many old peach-trees are being uprooted, having become unprofitable through silver-blight and other causes, and their place is being taken by apple and pear trees.—*J. H. Thorp.*

BLENHEIM.—All fruit is harvested. Apples are still coming into the auction-marts, but are mostly of inferior grades, realizing medium prices. Pruning and spraying are in full swing, and ploughing is in hand in some parts of the district.—*B. G. Goodwin.*

NORTH CANTERBURY.—All fruits are now harvested. The local markets are being fairly well supplied with apples, but few pears are offering. Prices are very good. Orchardists are now busy pruning, cleaning up, and preparing for planting. A fairly large number of new orchards are being planted this winter.—*W. J. Courtier.*

CHRISTCHURCH.—All crops are harvested, and pruning and general orchard operations are being pushed forward. The winter crop of tomatoes is only moderate; this, combined with moderate prices, is not encouraging to enterprising growers of second crops.—*G. Esam.*

TIMARU.—Growers in South Canterbury have seasonal work well in hand, such as pruning and spraying with miscible oils. Some are spraying their trees now with pure bluestone, and intend following this up with the spring formula of Bordeaux as soon as the buds begin to burst. They are using the bluestone (copper sulphate) in the ratio of 1 lb. to 20 gallons of water.—*A. B. Mansfield.*

DUNEDIN.—Planting is progressing apace, and winter pruning is in full swing. Great interest is taken in the practical demonstrations given in the various branches of fruitgrowing. The new fruit-case has been brought under the notice of growers, and has evoked a good deal of favourable comment.—*W. T. Goodwin.*

MARKET CONDITION OF LOCAL FRUIT AND VEGETABLES.

THE Fruit Inspectors of the Orchards, Gardens, and Apiaries Division report as follows on the condition of locally grown fruit and vegetables in shops and auction-rooms, and the market position of these for the month of June:—

AUCKLAND.—During the month business in the fruit-markets has been only moderate. Owing to the wintry weather the demand has not been too good. Highly coloured varieties of apples are selling well, and prime cooking varieties are in request. Pears are being offered in small quantities ex cool store—mostly Vicars—and sound samples are in demand. Hothouse grapes are selling at high prices owing to the nearness of the end of the season. The following prices may be taken as a fair average for the month: Apples—superior dessert, 8s. to 9s.; good, 7s. to 8s.; others, 5s. to 6s. Pears—best dessert, 9s. to 11s.; good, 7s. to 8s. Lemons—prime, 9s. to 10s.; rough and coarse, 4s. to 5s. Poor-man oranges, 5s. 6d. Hothouse grapes, 1s. 8d. to 2s. per lb.—*C. Berridge.*

WELLINGTON.—The apple-market is beginning to slacken. Supplies to hand are small, although the fruit lately is much better than previously. Prices are as follow: Apples—Jonathan, 8s. 6d.; Rymers (good colour), 5s. 6d. to 6s. 6d.; Spitzenberg, 6s. 6d. to 7s. 6d.; Auckland Dougherty, 8s. 6d. to 9s. 6d.; Hawke's Bay Dougherty, 9s. 7d.; other varieties such as Cleopatra, Wolseley, Monroe's Favourite, Five-crown Pippin, 5s. 6d. to 6s. 6d. Pears—Winter Cole, Josephine, 6s. 6d. per half-case; Easter Beurre, 5s. 6d. per case; Keiffer's Hybrid, 2s. 9d. to 3s. 6d. per half-case. Vegetables: Cauliflowers are in great demand, bringing the big price of 19s. per sack. Cabbages realized 9s. per sack, and all other vegetables are in good demand.—*T. C. Webb, jun.*

CHRISTCHURCH.—The supply of apples has been well maintained during the month, with moderate demand. Prime dessert varieties brought 7s. 6d. to 8s. 6d.; cookers, 5s. to 7s. Pears have been in good demand, but short supply. Dessert

varieties realized 7s. to 10s., and a few cookers, 5s. to 7s. Hothouse tomatoes brought 4d. to 6d.; walnuts, 6½d. to 7½d.; chestnuts, 3d. to 4d.; hazelnuts, 5d. to 6d.; grapes (only a few forward), 1s. to 1s. 6d. Potatoes sold at £2 15s.; onions —on strings, 6s. per cwt.; loose in bags, £4 per ton. Other vegetables are in good supply with the exception of cauliflowers, which are realizing up to 7s. per dozen. —*G. Esam.*

DUNEDIN.—The fruit trade in general has been exceptionally quiet during the past month. A fairly brisk demand exists for all classes of seasonable fruits, but these are not coming to hand as freely as might be expected, no doubt owing to the number of cases being cool-stored in anticipation of higher prices. It, however, behoves such growers as are holding their fruit to take into consideration the fact that the duty on Tasmanian fruit will be reduced to ½d. per pound in the coming month, and, as the season's crop is reported to be exceptionally good on the other side, heavy shipments from Hobart may tend to lower prices on the local market. Choice fruit is very much in demand, and good returns may be expected for any lines sent forward. The following are fair approximate prices for the past month: Apples—cooking, 1½d. to 2¼d. per lb.; medium dessert, 5s. 6d. to 7s. 6d. per case; choice Jonathan and Cox's Orange, 8s. 6d. to 11s. 6d. per case. Pears—choice Winter Nelis, up to 4d. per lb.; choice Josephine, up to 3½d. per lb.; other varieties, 2d. to 2½d. per lb. Tomatoes (very few are now available)—local hothouse, 7d. to 8d. per lb.—*C. Craigie.*

INVERCARGILL.—New-Zealand-grown fruits on the Invercargill market this month have been apples and pears grown in Nelson, Canterbury, Otago Central, and Southland districts. The bulk of this has been well-packed, clean, sound fruit. This is necessary in Invercargill owing to competition from Tasmania. Auction-rooms and fruit-shops were frequently inspected during the month, but it was unnecessary to issue any warning notices. Average prices for the month were: Apples—cooking, 3s. to 6s. 6d.; dessert, 6s. 6d. to 10s. 6d. per case. Pears—dessert, 8s. to 10s. 6d.; cooking, 6s. per case. Melons, 8s. per cwt. Potatoes, £4 to £5 per ton; on truck at country stations, £3 per ton. Cabbages, 3s. 6d.; carrots, 2s.; parsnips, 2s.; swedes, 2s.; all at per sack. Pumpkins, 7s. per cwt. Onions, £6 per ton.—*R. Hutton.*

HONEY-CROP PROSPECTS.

THE Director of the Orchards, Gardens, and Apiaries Division has received the following reports concerning the honey-crop prospects from the Apiary Instructors:—

AUCKLAND.—The returns of the honey exported from Auckland District are not yet to hand. Local prices for honey in 2 lb. tins and jars are the same as quoted in the last report: First grade in 2 lb. tins, from 10s. 6d. to 11s. 6d. per dozen; second- and third-grade tins, from 8s. to 9s. 6d. per dozen. Beeswax, 1s. 4d. to 1s. 5½d. per lb.—*G. V. Westbrooke.*

WELLINGTON.—Honey is selling freely, and prices are firmer than usual. Sections are realizing up to 7s. per dozen; honey in bulk, up to 4½d.; 2 lb. tins, 11s. per dozen. Prices realized for home shipments are not yet to hand. It is becoming more necessary than ever for beekeepers to put their honey up in attractive packages.—*F. A. Jacobsen.*

CHRISTCHURCH.—There is practically no change from last month with regard to the local market; the demand is good and price firm. Several lines of graded honey have left for the overseas markets. It may be to the advantage of producers to hold honey intended for export for the next two months, then start to export, so as to arrive on the Home market about the end of October; also to send a big consignment to arrive in November, to be ready for the Christmas trade in the Old Country. The best time to be landing honey is between October and March: the markets are usually bare at that time of the year.—*L. Bowman.*

DUNEDIN.—There is practically no alteration in the honey-market. Pat honey is coming forward steadily. Good sections are scarce. Prices are unaltered. Beeswax is very scarce.—*E. A. Earp.*

COMMERCIAL INTELLIGENCE.

CHINESE EGGS AT SAN FRANCISCO.

E. Clifton.

The importation of eggs from China is proceeding unabatedly. On the 3rd instant the s.s. "President" brought to San Francisco one transhipment from Seattle of 2,655 cases containing 79,650 dozens of Chinese eggs. The consignments are meeting with great opposition from the farmers of California; and no doubt it is owing to this shipment that the price of eggs in California has been very much below the average. The best eggs here are selling at 11d. per dozen, and the actual price at which the foreign importation reaches the consumer is 7½d. per dozen.

The Oriental eggs met with strong disapproval when first placed on the markets in Seattle, Vancouver, and San Francisco as being of the most inferior quality. They are, however, receiving vindication from the Board of Health. That authority entered into a thorough investigation. It undertook what is described as an investigation from a chemical and physical standpoint. The result announced is that they are equal in every respect to the California product of cold-storage eggs. The examination was made under the direction of Professor Jaffa, of the State Pure Food and Drug Laboratory. The report is that the Chinese eggs are slightly less in average weight than those of California, but this was the only feature in which they were inferior; and, with reference to the shells of the Chinese eggs being penetrated by bacteria or disease germs, the professor is said to have held the belief that one month in cold storage killed any germ that might have penetrated the shell. In practical results he found that the Chinese egg was as wholesome as that of the average one that is consumed.

Importation has been so large and so suddenly attained large dimensions that a great deal of speculation has been indulged in as to who were the chief operators in the transaction and with what results. It is claimed by one authority that a firm of wholesale liquor dealers made the first departure, and they imported very largely and disposed of this consignment at a profit of between £8,000 and £10,000 sterling. It is probable that the first importers made very considerable profits. They then competed against the California cold-storage eggs—in fact, they were said to be a substitute for the local production. It is claimed that these eggs can be placed on the market at 6¼d. per dozen.

A manager of a San Francisco produce-house who has had a considerable experience in China declares that the Chinese have no idea of handling or of the value of the eggs. He also says that they can be purchased and are bought in China as low as 2d. per dozen, and that with additional costs for freight, breakage, &c., they can be landed at San Francisco at something near 4d. per dozen.

This report is made not because New Zealand can enter very largely into this trade, but because certain inquiries have already been made on the prospects of the exportation of eggs from New Zealand. At present they could be but a limited number, and it is desired that it should be remembered all foreign eggs can only arrive here as cold storage, and however alluring the price of the fresh egg in San Francisco might be there is every probability that the price will be dominated by the price of these Oriental importations to the markets here.

San Francisco, 12th May, 1914.

ANSWERS TO CORRESPONDENTS.

CORRESPONDENTS are requested, when desiring information through the Journal in regard to disease in animals and plants, to forward, where possible, affected specimens, in order to facilitate a correct diagnosis of the trouble and to ensure the best advice. In stating a question the most complete descriptive details should be furnished.

Correspondents desiring information in regard to manurial treatment of soil are requested to fill in and forward the prescribed form—"Application for Advice as to Manurial Treatment of Soil"—obtainable from any office of the Department in the Dominion.

In every instance a question to which an answer is desired in these columns must be accompanied by the full name of the inquirer, not necessarily for publication, but as a guarantee of good faith.

A DAIRYING PROBLEM.

MR. W. T. LONDON, Kimbolton :—

I would like your opinion on the following formula :—

$$\frac{\text{Weight of butter} \times 82}{\text{Weight of cream churned}} = \text{per cent. of fat in the cream.}$$

The weight of the cream and butter brought to ounces, and the butter properly worked for farmer's own consumption.

The Dairy-produce Division :—

The formula is not one that can be recommended, because it is impossible to ascertain the percentage of fat in cream accurately by such a method. By far the simplest and most accurate way of finding out the fat-content of cream is by testing a sample by either the Babcock or the Gerber system.

VETERINARY SURGEONS.

MR. JOHN P. MCLEOD, Elgin :—

1. Have veterinary surgeons to be registered before they can practise? Who is the Registrar?

2. Who is the Registrar of Poisons for the Ashburton district?

3. Does a diploma from an American school of correspondence hold good for New Zealand?

The Live-stock and Meat Division :—

1. There is no legally necessary registration of veterinary surgeons in New Zealand at present, but a register of properly qualified veterinary surgeons is published half-yearly in the *Journal of the Department of Agriculture*. This register is prepared by the Director of the Live-stock and Meat Division.

2. I am unaware of any one being appointed Registrar of Poisons for Ashburton district. Under the Poisons Act it is necessary for every vendor to keep a record of the poisons sold by him.

3. We have no knowledge of diplomas of any kind granted by American schools of correspondence being recognized in New Zealand as constituting a proper qualification. Certainly no diploma in connection with veterinary surgery would be so recognized here.

Winter Feed for Sheep.

"New Chum," Blenheim :—

I have a few long-woolled hoggets that I would like to help a bit through the next two or three months. At present they are running in a clean, hilly grass-paddock, and so far have done satisfactorily. But with the approach of the coming winter and the usual hard frosty weather that we have a good deal of the grass is cut down, and there is not much substance in what is left. I have neither turnips, mangels, nor hay, but have some good oaten-sheaf chaff. If I give them some of that, is there anything you can recommend me to put with it to help the hoggets along and to induce them to eat the chaff ? I see a good many things advertised. I wish you would advise me what to try, and the quantities, and, if necessary, how to prepare it.

The Live-stock and Meat Division :—

The oaten-sheaf chaff by itself should be sufficient for the hoggets without anything else. It would be better, however, to give a few pulped roots with it. The other substances mentioned by you, while being excellent for some purposes, would probably be too expensive for feeding hoggets. A handful of salt may be scattered over the chaff every other day or so.

Dairy-farming.

"Beginner" :—

A heifer, after milking seven months, ran with the bull for five months, and she is not in calf. She was then put to another. If this fails would it be any good trying again ? The heifer gave 170 lb. of butter-fat for her seven months. She has now been milking for sixteen months, and is still doing as well as those which have been milking eight or nine months.

The Live-stock and Meat Division :—

Your question is not quite clear. You say that "after milking seven months she ran with the bull" (which is not a good practice) "for five months, and is not in calf. She was then put to another bull." You should certainly have a good idea whether the last service was successful by her failing to come in œstrum since the service. If she has not you may conclude that she is in calf. If she is not, we would certainly advise you to try her again.

Horse affected with Itch.

"Farmer," Matakanui :—

I have an eight-year-old horse, which I am working every day, which has a very bad itch about the legs and tail, and as he is always scratching on posts and destroying fences I would like to know if there is any cure for it.

The Live-stock and Meat Division :—

It is probable that the itching is due to a small mite or acarus, the condition being commonly termed foot-mange. Thoroughly dress the parts every third day with kerosene emulsion, rubbing it well into the hair with a stiff brush. The emulsion is made as follows : Add 1 lb. of soft-soap to a gallon of soft water and simmer over a slow fire until the soap is dissolved ; then remove from the fire and add half to three-quarters of a pint of kerosene ; stir until the oil mixes with the soap-solution and the whole has a creamy consistency. It would be as well to syringe his favourite rubbing-posts with a strong solution of some coal-tar sheep-dip.

J. A., Wairoa :— CARE OF STALLION.

Will you please give me some information on the best food and general attention I can give a stallion I have recently purchased ? He is very poor and out of condition, and I want to make the very best of him before next season. I am willing to spend a good deal on him in food and attention. I believe there are certain patent foods that are very good : will you please name them ? What is the best leg-wash for dirty legs inclined to be greasy ?

The Live-stock and Meat Division :—

It would have been all the better if you had stated the breed, age, and what the animal has previously done in the way of service. We note, too, that you wish to know a suitable wash for a horse's legs inclined to be "greasy." Is this wash for the stallion ? If it is, we should advise you to be careful in breeding from a horse of this description. Grease, while not being actually hereditary, is very apt to show in stock where the parents, or one of them, have the condition. It is generally seen in animals of a heavy lymphatic constitution, with coarse hair and "gummy" legs. Of course, it may be caused by neglect, dirt, &c., but when it occurs there is generally a predisposition to it in the animal's system. With regard to feeding, there is nothing better than good oats, hay, oaten chaff with a little bran, and a few carrots. A bran mash with linseed at the week-end is beneficial. This feeding, with good grooming and regular daily exercise, should get him in good stud condition. The food should be given dry. There is no necessity to boil food for horses. You will have to be guided in the quantities of your ration by the way he progresses ; but we should not advise you to give him more than 6 lb. of oats daily to commence with, especially if he is the animal referred to as wanting a wash for his legs. You should pay attention to his feet and see that his sheath is washed out regularly with soap and warm water. With regard to "greasy" legs, if they are not bad we should advise you to thoroughly wash them with hot water in which two handfuls of ordinary washing-soda to the gallon has been dissolved. When dry, dress with the following lotion : Acetate of lead, 1 oz. ; sulphate of zinc, 6 drams ; water, 1 quart. The legs may be dressed every two or three days if necessary ; otherwise keep the legs dry. We do not advise patent foods or medicines.

DISEASE AFFECTING PIG.

"£ S. D.," Southland :—

While wild-pig hunting I picked up a young sow, which I reared. It was allowed to run about all the time. When the pig was a good size and fairly fat to look at I killed it. When the animal was opened up a loose bolus tumbled out. This was a brownish-grey colour, and had been about the size of a fist. It was empty when picked up, and its skin was double the thickness of the walls of the intestines. I might have pierced it when opening the pig. Hanging in a circle behind the kidneys were about six or eight icicle-looking growths of various lengths—some about 4 in. long and 2 in. in diameter. In the mesenteric fat were whitish enlargements which I have never seen before in a pig. The pig was exceptionally fat internally, but was dumped owing to these defects, as I thought it unfit for food. When going about the pig was very friendly with two pups—one especially, and this one took distemper so badly that I had to destroy it. Would the growths be some infection got from the dogs, as in their frolics it might have been bitten ?

The Live-stock and Meat Division :—

We could not say what the "bolus" was, nor yet the whitish enlargements in the mesenteric fat. If you had sent them in some preservative

fluid to the Officer in Charge of the Veterinary Laboratory, Wallaceville, they could have been identified. With regard to the icicle-like growths, these were no doubt the so-called slender-necked hydatid (*Cysticercus tenuicollis*), the larval stage of one of the tapeworms of the dog (*Taenia marginata*). There is no doubt that the pig became infected by picking up the eggs of the worm passed in the fæces of the dogs. We would advise you to give your dogs one or two doses of worm-medicine.

LUCERNE.

"FARM 67," Leeton, Yaneo, N.S.W. :—

I have recently settled here from New Zealand, and still subscribe to your *Journal*. I note with interest your experiments on lucerne. We are having much trouble here in obtaining a permanent stand of lucerne that will give a cutting of more than a very few hundredweight. Below the 6 in. of fine soil there is 6 in. of very tight clay, and following that a more open clay with limestone nodules. All seed germinates well and grows for a few months; then it stands still, the leaves becoming smaller. We water every fortnight, when it appears to take fresh growth for a week or two, and again fails, as the surface becomes packed and baked, so much so that the discs have little effect on it. We are all new here, but some are trying liming, subsoiling, and green-manuring. The roots do not appear to get down more than 2 ft. The variety is Hunter River. The expense of subsoiling and liming here is very great, but I intend to try them in a small way. Could you suggest anything that might lay me on the right track? Contrary to general opinion here, I believe the plants are being choked out by excessive watering and the after-caking of the soil. Top-dressings of fertilizers have no effect, but I notice a slight improvement on the land previously growing a crop of wheat, compared to that on virgin land. I should be most thankful for a suggestion from you. I append hereto a copy of the Government analysis of the soil. I may mention that the land appears to drain fairly well.

The Fields and Experimental Farms Division :—

The 6 in. of stiff clay subsoil has very probably a great deal to do with your difficulty in obtaining a good stand of lucerne, the plant doing fairly well until it strikes the hard pan. Try subsoiling by ploughing twice in the one furrow, the second time with mouldboard of plough removed. Green-manuring by ploughing under a quick-growing crop like white mustard, or the imperfect stand of lucerne itself, will greatly improve the physical condition of the surface soil as well as enrich for more successful plant-growth. Plough under, if possible, during moist weather, and with a fairly upright furrow. When you have obtained a fairly good stand of lucerne, by sowing in drills about 10 in. apart, cultivate to conserve moisture by breaking the crust that forms on the surface. With irrigation make provision for drainage, and try ground limestone as soil-improver. Use 20 to 30 cwt. per acre. You could try a small area of an acre or two first upon soil treated as above described. Make provision for inoculation of the soil (about 3 cwt. per acre, applied in the evening and at once harrowed into the soil) with soil taken from an area that has already grown lucerne successfully. When seeding use about 1 cwt. per acre of sulphate of potash, and apply about 3 cwt. per acre of basic slag some time before sowing the seed. During the first six weeks of growth is the most critical time with lucerne, hence do not irrigate then, but a week before first cutting. Irrigate just before each cutting, but usually before the first cutting is enough. There is a danger of over-irrigation with lucerne. Practise cultivation together with irrigation. Obtain success with a comparatively small area before attempting extensive seeding.

LUCERNE.

MR. G. G. NEWTON, Bredwardine, Hawarden :—

I tried to get a strike of lucerne on a paddock of about 8 acres last year. I followed out the directions given in one of the numbers of the *Journal*, with very poor results, which I attribute to drilling too deep. The land is medium to good on a good clay subsoil, and grows clover splendidly. The following is the history of the trial: The land was cropped out of grass with rape, which got 1 cwt. rape-manure. In the autumn the land was ploughed 6 in. deep and left till spring, when it was disced twice, harrowed twice, rolled, drilled, harrowed—with harrows upside down—and rolled. The lucerne came very patchily, and is not worth leaving, and where the lucerne failed white clover came. I am going to try again this year, and would like your advice on several points :—

1. Could I take inoculated soil now from the patches where the lucerne came well, and put it into bags in the shed until sowing-time, as I want to plough the paddock now ? Would it be better not to plough until spring ? How deep do you take the soil for inoculation purposes ?

2. What manurial treatment would you advise ? Would 5 cwt. ground lime, 3 cwt. guano, and 3 cwt. basic slag do ?

3. What kind of seed, and what quantity per acre, would be most suitable for this district ? We have hard frosts in winter, but lucerne grows, as I know of a paddock in Waikari. I propose to plough the ground after you reply, and leave it till spring. Then, after thoroughly working the ground, roll and broadcast the seed and brush-harrow and roll again.

The Fields and Experimental Farms Division :—

1. It is probable that soil taken from patches where the lucerne came well contains sufficient bacteria for inoculation purposes. Provided the patches of satisfactory growth are large enough, you could take some of this soil, but it must be stored in a dark, somewhat damp place. Drying out of the soil and exposure to light kills the bacteria. To avoid this risk it would be better to let the field go till spring, then collect the soil, plough under the crop, and resow in, say, a month's time. Soil for inoculation purposes is taken to a depth of 1 ft. to 18 in., depending upon the depth of the soil, rejecting the first 3 in. of soil.

2. As lucerne requires a fair quantity of lime, 20 cwt. per acre of ground limestone would be more effective, unless, of course, the land has been previously limed, when basic slag (3 cwt. per acre) would be preferable. It should be worked in some little time before seeding. With seed use also 1 cwt. sulphate of potash.

3. Hunter River or Marlborough-grown seed would suit best. Sow 15 lb. to 20 lb. per acre. Turning under the first crop of lucerne should, together with the additional treatment, ensure success with the crop, provided the land is clean. After final rolling, brush-harrow to provide a thin dust mulch and so conserve moisture.

LUCERNE.

MR. T. BEVINGTON, P.O., Halcombe :—

Does the Government still supply lucerne-seed and inoculated soil for a trial plot ? I want to try about one-fifth of an acre. I have dug the ground to a depth of 10 in.—black loam about 8 in. to 9 in., and subsoil clay. Do you think lucerne would be likely to take on that ? What manures and quantity would you advise ? If the Government does not now supply the seed and inoculated soil, could you tell me the best variety for that class of soil, and where would be the best place to get it from ?

The Fields and Experimental Farms Division :—

It has not yet been decided whether the Department will renew its offer of free material this season. Should it be so decided, due notice will be given in the *Journal*. It cannot be definitely stated whether lucerne would succeed on the land described. If you decide to give it a trial, the land should be ploughed at once and allowed to lie fallow until the spring. Lime should be applied at the rate of 1 ton per acre. Basic slag (3 cwt. per acre) should be applied previous to or at the time of sowing the seed. 15 lb. to 20 lb. per acre of seed should be used. This should be sown in drills 14 in. apart to admit of weeding, and so give the lucerne a better chance. Colonial or Marlborough-grown seed can be procured from any leading seedsman. Inoculated soil can be supplied by the Department at 2s. per cwt. f.o.r. Moumahaki. 3 cwt. per acre should be used.

Eradication of Foxgloves.

Mr. H. Sander, Tarata, Taranaki :—

Could you give me some information in regard to the eradication of foxgloves ? This is a subject which I think is of interest to a large number of readers of the *Journal*.

The Fields and Experimental Farms Division :—

Foxglove is most difficult to deal with, and there are no really effective methods of eradication known. Pulling out the plant before seeding is undoubtedly the best, although somewhat tedious and costly. If the weed is so far confined to a patch on your land I should advise fencing this off and pulling out all you can, and spraying the young plants with some weed-destroyer such as "Pharos" or "Austral."

Mustard for Green-manuring.

"Subscriber," Churchill :—

1. Would mustard be a suitable crop to grow on tea-tree and fern country for ploughing under ?
2. How long would it be necessary to let the land lie after ploughing-under mustard before working it ?

The Fields and Experimental Farms Division :—

1. The white mustard should be suitable for green-manuring purposes on tea-tree and fern country.
2. Under average conditions the land should be left at least a month. The greater the rainfall the faster will the green material decompose. On your class of land it would be advantageous to let the land lie as long as possible, for weathering (exposing to the atmosphere) greatly improves soil which has grown tea-tree and fern.

Bird-lime.

Mr. G. Reveley, Kimberley :—

Will you kindly let me know where the bird-lime introduced by Mr. A. A. Corban and tested by the Department at Waerenga Experimental Farm can be purchased ?

The Fields and Experimental Farms Division :—

The bird-lime tested by the Department was obtained from Mr. A. A. Corban, Mount Lebanon Vineyards, Henderson, Auckland.

THE ALGAROBA FODDER-BEAN TREE.

MR. J. F. BLACK, Awaroa :—

Would you advise planting this tree ? If so, could you tell me whether the seed can be obtained in New Zealand, and at what price ?

The Fields and Experimental Farms Division —

This tree is reported as being very useful, it being suitable for almost any soil, but especially for dry soils,* and the beans it produces are said to be useful for feeding to all kinds of stock. Thus, it is valuable for providing fodder for stock under extreme conditions. The bark is reported also as being used for tanning purposes. The plant is, however, frost-tender, and on this account would be suitable only for regions where frost is absent. A small quantity of seed may possibly be obtained from the Tauranga Experimental Farm, Tauranga, or, failing this, from the Department of Agriculture, Honolulu, Hawaii, where it grows extensively.

FEEDING DAIRY COWS.

MR. CYRIL T. WHITE, The Peaks, North Canterbury :—

Will you please advise me regarding chaff for cows ? Should it be cut long—*i.e.*, coarse—or short as horse-chaff, and why ? If coarse, to what extent ? I may add that I want to give the cows chaff with pulped roots.

The Live-stock and Meat Division :—

It is generally thought that chaff for cattle should be cut at least as long again as for horses, the reason being that cattle are ruminants, and the main portion of the food should be lengthy, so as more readily to regurgitate during that act. Cut the chaff about 1 in. in length for mixing with the pulped or "fingered" roots, and give some long hay or oaten sheaf as well.

FODDER FOR COWS.—ERADICATION OF BLACKBERRIES.

MR. R. D. MCCORMACK, P.O., Omahu :—

I have just fed off a paddock of turnips on tea-tree and fern hillside. The land is light to fairly heavy ground. Would you kindly recommend a suitable crop to sow for spring and summer feed ? I wish to sow into grass in autumn, and want a crop suitable to prepare the ground. Would kale or oats do ? I want it for cattle-feed. Which manures would you advise using ?

Do you know of any successful spray for killing blackberries ? I have used two different sorts, but have not been completely successful with either, although Long's weed-destroyer did good work.

The Fields and Experimental Farms Division :—

For sowing right away you could use Cape barley or Emerald rye and Winter vetch (*Vicia villosa*), or Scotch Black Winter vetch. For sowing a little later (early spring) Thousand-headed kale would serve you well. A second sowing of the kale might be possible after feeding off. Oats would grow, but the rye would produce more satisfactory growth at this time of the year. Land broken in from tea-tree and fern would be greatly benefited by a dressing of lime. A ton per acre of finely ground limestone applied in winter would be good treatment. For the rye and vetches apply at sowing 2 cwt. to 3 cwt. per acre of superphosphate and 100 lb. of sulphate of potash. When the crop has made some growth a top-dressing of, say,

*It can readily be grown from seed on poor waste lands.

100 lb. of nitrate of soda will send it along quickly. Greater results will be obtained from the superphosphate by first liming the soil, provided, of course, the soil is not already well supplied with lime. For the kale apply 2 cwt. superphosphate and ½ cwt. of sulphate of potash at seeding, and as a top-dressing, when the crop has made fair growth, 1 cwt. to 2 cwt. of nitrate of soda.

We do not know of any really successful spray for killing blackberries. There are a number on the market, but although trials have been conducted none has proved absolutely effective.

DISEASE OF TURNIPS.

"INQUIRER," Stratford :—

Could you inform me as to the cause of turnips going rotten ? I have about 5 acres—first crop—and about three parts or more are affected. It starts on the top, near the stem, with a small brown patch with a hole in it, and gradually gets larger until the whole top gets affected. Would the manure—Pyramid turnip and superphosphate, 2½ cwt. per acre—have any effect on them ? The land is rather low-lying. I have heard of others going the same way on high land. Mine went the same way last season on second-crop ground. In both cases the seed was Superlative—I believe, locally grown. Would that have any effect ?

The Fields and Experimental Farms Division :—

This would appear to be the disease of turnips and other members of the family known as black-rot. It appears to be more prevalent in rich, new ground containing much decaying organic matter. Low-lying ground also appears to be more suitable to its ravages. It is not considered that the manure used introduced the disease. The organism is more likely to be present in dung, especially if roots affected with the disease had been fed to cattle on the land used for the turnip crop. Neither is there any evidence to show that the Superlative variety of swede is specially susceptible to the disease. Treat the soil with ½ ton to 1 ton of freshly burnt lime per acre after having provided for effective drainage. Remove and destroy the remains of all affected roots after feeding off.

MANGELS.—CHOU MOELLIER.—SWISS CHARD.

"BEGINNER," Mauku :—

1. Could you tell me when to sow mangels for transplanting in order to have large roots in February, such as I saw in a show last February ?

2. What is the earliest time to plant chou moellier and Swiss chard for transplanting ? Transplanting gives much trouble here on account of sorrel.

The Fields and Experimental Farms Division :—

1. Sow as early in August as the seasonal conditions will permit. From your knowledge of the latest date when frost in spring is known to occur you can determine when best to sow the seed, as mangel-plants are frost-tender. Transplant, if possible, during a wet spell.

2. The same conditions apply to Swiss chard as to mangels. Chou moellier is not so frost-tender, and hence can be sown early in the spring. Sow as early in August as the weather-conditions will permit of working the soil and of enabling the crop to make continuous growth. Your knowledge of local conditions will also determine this. Transplant when the soil is saturated, if possible. Cultivation and the use of lime—say, 1 ton per acre of finely ground limestone—should reduce the sorrel very considerably.

"FARMER," Anama :— GREEN-MANURING.

I was interested in the article in the May issue on green-manuring, and I would be obliged if you would answer the following question: If I sowed oats or mustard, say, in August and ploughed it in November, would swedes or turnips get the benefit of such green manure if sown in December? My land has 5 in. of soil, with 2 ft. of clay subsoil.

The Fields and Experimental Farms Division :—

Both swedes and turnips, more particularly the former, would benefit by turning under mustard and oats one month before sowing the root crop, provided there is sufficient moisture to cause decomposition of the organic matter incorporated. The rapidity with which the green manure decomposes depends on the humidity of the atmosphere. Dry weather-conditions following on the ploughing-under of the green crops would probably prove detrimental to the roots, on account of the slowly decomposing organic matter taking up the available soil-moisture. The amount of moisture available after the ploughing-in of the crop is, then, the determining factor.

DRILL.—SHEEP-FARMING.

"COCKATOO," Ohura :

1. Will you let me know what drill you would recommend to sow seed and manure for a small farmer cropping about 10 acres each year?

2. How many lambs should 5 acres of swedes carry—fair crop—and for how long?

The Fields and Experimental Farms Division :—

1. Grain-drills are made in different sizes, depending upon the number of coulters and the distance apart. A drill of, say, eight coulters set 6 in. apart should suit your purpose. By communicating with any of the well-known implement firms you can obtain more detailed information. There is also a small one-horse grain-drill used in America and designed for seeding-in late crops between the drills of standing maize, its use being equivalent to cultivation. This may also suit your purpose. Full information could doubtless be obtained by communicating with the agents for American machinery.

2. A fair crop of swedes of 5 acres should carry 250 lambs for at least six weeks. By the use of wire netting and feeding closely in strips they could be kept on longer. With dry feed, such as hay or pea straw, or with occasional grazing on grass, the crop, of course, would go much farther.

"PARAPARA," Kawhia :— PENNYROYAL.

Could you suggest some means of eradicating a weed commonly called "pennyroyal"? Is it in the noxious-weeds schedule?

The Fields and Experimental Farms Division :—

On pasture land pennyroyal is an exceedingly difficult weed to suppress. Where the land can be ploughed, this operation, followed by fallowing, is successful, but such procedure can be adopted only in certain isolated cases. In general the presence of pennyroyal is indicative of sour, badly drained land, and complete drainage is the first essential in the control of this weed. After drainage, top-dressing with basic slag is often very helpful. Where drainage cannot be carried out good results have been secured by using any of the powdered arsenical sheep-dips, the patches being sprinkled with the powder. This treatment, however, necessitates the shutting-up of the pasture for some considerable time after application. Pennyroyal is a gazetted noxious weed in the Kawhia County.

PLANT FOR IDENTIFICATION.

"DROVER," Tolaga Bay :—

Would you let me know the proper English name of the plant enclosed, and also its feeding-value to stock? In travelling round this part of the Island I have come across it growing on sheep-camps. Horses eat it greedily, and will also eat roots and all if pulled for them. People have a different name for it in mostly every locality.

The Biologist :—

The plant sent is Musky Storksbill (*Erodium moschatum*), belonging to the same family as the geraniums and pelargoniums of gardens. Another species of the same genus (*E. cicutarium*) has been much used in America as a forage plant under the name of "alfilaria." The seeds are sometimes troublesome in wool. Both of the species mentioned are widely naturalized in New Zealand, but neither is of any value, as stock do not appear to touch them unless in a starving condition. Their appearance on sheep-camps is due to the way the seeds cling to wool, in the same way as do the seeds of horehound, another common and useless plant found in such localities.

VEGETABLE-CULTURE AND FRUITGROWING.

"BEGINNER" :—

1. Will you please tell me where I can procure Carter's Springtide pea, mentioned in the *Journal* for July planting? I have tried several merchants without success.

2. I planted a box of cauliflower-seed that did well. When they were ready for transplanting I put in more from the same seed in another box on the same bench. Before these got their second leaf they began to dry up, the stalk beginning under the ground. The leaves or heads fell over, and were the last to show signs of sickness. One morning I picked out over three hundred nice-looking seed-leaves, with only a hairlike thread for a stalk. Can you say how to treat?

3. Will you tell me, please, how to grow Brussels sprouts? I tried this year, but some formed bushes, sprouting out underground. These grow when broken off. Others put out branches instead of buds above ground.

4. I have a small orchard of fifty trees one and two years old. Is there any one here who will prune and instruct for future use at a moderate charge?

5. As children we used to gather hundreds of moths out of the flowers of a creeper we called "codlin-moth": is it any use growing this creeper round an orchard?

The Orchards, Gardens, and Apiaries Division :—

1. We have obtained Carter's Springtide pea from F. Cooper and Sons, of Wellington. If it is not in stock, grow Daybreak: there is very little difference.

2. Failure may have been the result of several things. It may have been caused by eelworm in the soil. This is a difficult thing to deal with. The best preventive measure is to keep the compost heap quite clean—allow no weeds of any sort to grow on it. Eelworms live on the roots of plants, and, I think, also decaying vegetable matter; they do not exist in clean soil. It may have been the result of too much artificial manure: either lime or soot in excess will cause decay of roots. Wet stable manure in the bottom of the box during the short days may cause trouble, particularly if the soil becomes too wet or insufficient air is given. During winter such plants require abundance of air and a rather dry condition of soil. Another likely cause may be loss of centre leaves by means of the caterpillar of the diamond-backed moth. The whole thing looks like inexperience in treating what is a by-no-means easy plant to grow in boxes in winter. Far better grow them in the open ground.

3. Brussels sprouts: Your account of the behaviour of these plants points to their having been injured by the caterpillar of the diamond-backed moth. Evidently the crown of the plants was injured; they are then likely to behave in the way you describe. Seasonable reference to Brussels sprouts will be made in the *Journal*: watch for it. Starting too early is likely to end in failure; the sprouts should come in winter, not in summer.

4. If you apply to Mr. B. G. Goodwin, Orchard Instructor, Blenheim, he will instruct you how to prune your trees free of charge.

5. The codlin-moth plant will capture many species of moths, but not the codlin-moth, so that it is valueless in connection with the control of that pest.

LUPINS FOR GREEN-MANURING.—ARTICHOKES FOR PIG-FEEDING.

"ANXIOUS TO KNOW," Tikorangi:—

I have read several good reports as to the value of lupins for green-manuring. Are lupins the best to use for such a purpose? What is the most suitable variety, and the best time to sow?

I propose to plant about half an acre in artichokes for pigs. Are they considered of the best (combined with a minimum of work) for pig-feeding? What is the quantity for and the time for sowing?

The Fields and Experimental Farms Division:—

For sandy and light soils generally lupins are perhaps the best to use for green-manuring purposes, but for heavy soils they are surpassed by other crops, and for wet soils, also soils containing an overabundance of lime, they are unsuited. The blue lupin especially is readily injured by lime, and for this reason grows well on acid soils. Low-lying wet soils, generally being acid, would therefore be much more suited to the growing of the blue lupin than to that of the other varieties. For soils inclined to be alkaline, soils containing lime in abundance, or brackish soils near the seashore the white and yellow varieties would give the best results. From the above you may possibly be able to decide what variety would suit your particular soil. Sow the seed in the spring when all danger of frost is past.

For pig-feeding artichokes are considered to be excellent, being slightly higher than potatoes in nutritive value. They should, however, only be regarded as a supplementary crop, other feed being provided on the farm for the pigs. They are well suited for keeping pigs on the lot principle, providing a several weeks' ration and shade during the hottest period. The soil should be well drained, light, and dry. Poor or gravelly soils on the farm are well suited to growing artichokes if not for other crops. Like potatoes, they are planted in sets. Rows 3 ft. apart and single sets placed therein 2 ft. apart is the best method of growing the crop, and cultivation carried out as with potatoes. Being frost-resisting, they can be grown early in the spring. Use potash manures.

MACROCARPA HEDGE.

MR. A. L. BAUMGART, Norsewood:—

Several trees in a twelve-year-old macrocarpa hedge are dying out. Is it practicable to replace these without interfering with the rest of the hedge? If not, what is the treatment recommended?

The Orchards, Gardens, and Apiaries Division:—

It is possible to replace these provided that the old trees adjacent to the young ones planted have their limbs trimmed so as to admit light and air to the young macrocarpa. Interplanting with *Escallonia macrantha* or *Ingramii* is also an effective method of filling gaps in the lower parts of hedges. Escallonias are amongst the few shrubs which will grow well under other trees.

INSECT FOR IDENTIFICATION.

MR. S. A. LOWIS, Jun., Crystal Farm Estate, Blackstone Hill :—

I enclose for identification a greeny-coloured insect that has been playing havoc on my fuchsias, mainly the "midnight" ones. Could you tell me the quickest way to rid the plant of this insect? I have been told that to fumigate them with sulphur will destroy them. Would this in any way affect the healthiness of the plants?

The Orchards, Gardens, and Apiaries Division :—

Macdougall's fumers can be recommended for the control of this pest. The use of sulphur as a fumigant would probably cause serious injury to the plants.

WOOLLY APHIS.

MR. E. J. HODREN, 6 Argyle Street, Hawera :—

Enclosed please find a cutting of an apple-tree. You will see that it is badly affected with woolly aphis. I desire to know if the growths on the cutting are due to the woolly aphis. If not, what could you recommend? These knotty growths are spreading all over the trees, which bore well these past two years, and is now only about five years old.

The Orchards, Gardens, and Apiaries Division :—

The knotty growths on the apple-twig are due to woolly-aphis infection. In order to control this pest it is necessary to spray the trees, when quite dormant, with red-oil emulsion, using 1 part of emulsion to 15 parts of water. Paint any colonies which may escape the winter spray with the emulsion, *undiluted*. Red oil, already emulsified for mixing with water, is procurable from seedsmen and other merchants.

BLACK-SPOT OF APPLES AND PEARS.

MR. ARTHUR EDE, Hampstead :—

What could I use for the black-spot on the apples and pears, as my fruit was very badly infected with it this season?

The Orchards, Gardens, and Apiaries Division :—

To control black-spot the trees should be carefully sprayed in early spring, when the buds are beginning to swell, with the 10-10-40 formula of the Bordeaux mixture, and again, if necessary, with the 4-5-50 formula once or twice after the fruit has set. Directions for making the Bordeaux mixture can be obtained on application to the Department.

BEES IN RELATION TO FRUITGROWING.

MR. R. CALDWELL, Karori :—

The beginning of last season being cold and wet very few bees were seen in the orchard. Are the meagre setting of the fruit and early falling of what did set of apples and cherries in any measure traceable to this dearth of bees? Would a swarm of bees do good in the orchard? Where can I get a swarm of bees?

The Orchards, Gardens, and Apiaries Division :—

It is very probable that the meagre setting of fruit was due to the absence of bees in the orchard. There is no doubt that bees are a very necessary adjunct to the orchard. The Apiary Instructor has been asked to advise you where a swarm of bees may be procured.

OBTAINING CUPRESSUS-SEED.

MESSRS. DAVEY BROS., Jerusalem, Wanganui River :—

We are enclosing under separate cover two specimens of same variety of cones. Please advise through the columns of your valuable *Journal* how to separate the seeds from the cones, and at what season of the year to plant same.

We have also been planting chestnuts. When should the nuts be planted for the purpose of raising young trees? To what extent should the nuts be dried before planting?

The Fields and Experimental Farms Division :—

The cones of the Cupressus should be hung up in a loose bag in a sunny position. They will then gradually open. It is not advisable to sow the seeds till next October, so that if the cones are gathered now the seed will probably be falling out by the time it is required. If the cones still remain closed mechanical means of opening them will have to be used. Special heating-apparatus has been devised for this work, but is not required when only a small amount of seed is required to be extracted. Some people put the cones in the oven, but this often results in the killing of the seed. The cones, however, that were sent are already beginning to open, so that there will be no difficulty experienced.

The chestnuts should be sown in October. The nuts should be well dried before being sown

CALF-REARING.

MR. J. STOREY, Manawaora, Russell, Bay of Islands :—

We are rearing thirty or more calves yearly, and we find the cost of patent calf-foods heavy—say, 5s. per calf. We believe we could reduce the cost of rearing by using linseed, as at Ruakura Farm of Instruction. We would like to know how to prepare the raw linseed for calf-food and the supposed cost per calf.

The Fields and Experimental Farms Division :—

In rearing calves at the Ruakura Farm of Instruction no meal of any kind is cooked or even steeped. The pure crushed raw linseed (not the crushed linseed cake) is used. When commencing to give separated milk and reducing the new a heaped teaspoonful is well stirred into the milk just before feeding the calf, and this quantity is increased as the new milk is decreased until a maximum of two teaspoonfuls each meal-time is reached. As soon as the calf commences to chew its cud a small handful of dry crushed oats is given, but on no account in the milk. This is also increased to a maximum of ¼ lb. in the case of ordinary dairy stock; stud bulls receiving double that quantity. The cost of this feed averages about 4d. per calf per week, and the saving of labour is very considerable. Sweet well-harvested hay should also be given, and a supply of rock salt. The Ruakura calves have also a pinch of carbonate of soda in each meal of milk. On the above diet, along with cleanliness, not a single case of scour occurred last season.

AN UP-TO-DATE COW-SHED.

MR. R. N. LINDSAY, Clevedon :—

Could you inform me how to build an up-to-date ten-bail cow-shed for hand milking which could be utilized later on for machine milking? I have heard that the race cow-shed is the coming one, but have never seen it.

The Dairy Produce Division :—

In response to the above we are forwarding direct to the inquirer lithograph copies of three different plans of cow-sheds. Any one of these we can recommend. The one most favoured by farmers, however, is that marked "run-through shed." The quantities of material required are marked upon each plan, and if the inquirer submits these to any timber-merchant or carpenter he will be able to obtain what he requires. We are strongly in favour of concrete for the floor of all cow-sheds, and also for the approach from the yard. In many cases the yard is also covered with concrete; this is a very great advantage. Suitable drains should be provided. We can recommend nothing better than an open concrete channel with the discharge end situated some distance from the building.

Timber for Fencing.

"Inquirer," Tolaga Bay :—

Would you inform me which would be the best timber to plant to secure a future supply of fencing-material? I wish to cut down the manuka which is already growing on the banks of the river and plant fencing-timber instead. The soil is rich and about 50 ft. above sea-level. Can I purchase plants from the Government experimental farms?

The Orchards, Gardens, and Apiaries Division :—

A timber-tree that has been planted in the Waikato district for fencing-material is the *Robinia pseudo-acacia*, from which very durable posts are secured. The black-wattle (*Acacia decurrens*) also provides useful timber for posts and stakes and excellent firewood. The Government experimental farms do not propagate such plants for sale.

Lime.

Mr. John Hubbard, Paeroa :—

What form of lime is it that is obtained from acetylene generators as residue? What is its value in the flower or kitchen garden?

The Agricultural Chemist :—

The refuse is practically slaked lime, for which it may be used as a substitute. It should be allowed to remain exposed to the air for some time before applying it to the soil.

Raspberries.

"Hatherley," Fendalton :—

This useful fruit is becoming almost a past luxury owing to the ravages of the borer. Has the Department made any experiments in the direction of destroying the pest or reducing its destructive work? If this can be done by spraying, what mixture should be used, and what is the proper season to operate? I had a fine bed, abundantly productive, but now almost ruined. I tried cutting half the bed clean off and burning the canes. The first time this seemed to answer, and there was a great crop the following season. This year, however, those I cut off seem as bad as the old ones—scarcely a bud to be seen.

The Orchards, Gardens, and Apiaries Division :—

Spraying with arsenate of lead in the proportion of 1½ lb. to 50 gallons of water just before the buds commence to swell in spring is suggested.

IMPORTATION OF MEAT INTO SWITZERLAND.

It will doubtless be remembered that by a Provisional Decree of the 14th December, 1911, the duty on frozen meat into Switzerland was reduced from 25 francs per 100 kilos to 10 francs per 100 kilos. The Director of the Live-stock and Meat Division of the Department has now been advised by Mr. Crabb, New Zealand Veterinary Inspector in London, that the Swiss Government has reimposed the original duty of 25 francs per 100 kilos as from the 1st May last. Unofficial representations were made to the Swiss Government pointing out the effect which such a raising of the duty would have on the importation of frozen meat, but it was learned that as the Provisional Decree had been made on account of the high price of meat, which has now resumed its former level, there was little likelihood of the concession in the matter of the import duty being extended.

AGRICULTURAL AND PASTORAL STATISTICS.

THE following table, compiled from returns collected through the post, gives the average actual yields of field crops for the season 1913–14:—

District.	Bushels, per Acre.					Lb., per Acre				Tons, per Acre.		
	Wheat.	Oats.	Barley.	Maize.	Peas.	Rye-grass.	Cocks-foot.	Red Clover.	White Clover.	Pota-toes.	Turnips.	Man-gels.
Auckland	29·94	39·91	33·24	52·35	12·10	433·65	125·87	98·69	..	7·29	15·15	29·65
Taranaki	30·24	40·80	35·32	..	35·00	315·71	148·36	..	..	6·17	20·64	31·65
Hawke's Bay ..	35·65	44·87	45·95	40·86	21·43	428·08	89·67	..	73·37	5·76	13·74	49·03
Wellington	33·79	41·14	35·62	..	26·62	354·68	148·20	..	..	6·36	17·63	31·20
Marlborough	31·49	41·50	39·30	..	31·13	200·00	397·41	163·60	..	5·73	10·19	18·02
Nelson	31·00	42·06	26·42	..	25·90	366·55	108·89	179·44	..	5·56	13·97	32·69
Canterbury ..	31·60	42·32	38·30	..	35·40	415·80	197·16	157·82	159·48	6·05	11·20	26·24
Otago	30·36	41·94	38·43	..	28·75	354·85	213·88	200·00	..	3·30	11·55	23·59
Southland	28·43	36·13	43·36	..	30·00	386·54	148·11	..	..	4·41	12·34	25·43
Averages for the Dominion	31·37	40·75	37·65	51·79	31·64	392·89	191·11	163·10	138·30	5·39	13·03	29·99

The average grain-yields for the 1912–13 season were: Wheat, 27·28 bushels; oats, 35·12 bushels; barley, 36·75 bushels.

INTERIM RETURN OF SHEEP

IN THE DOMINION ON THE 30TH APRIL, 1914.

APPROXIMATE NUMBER OF SHEEP IN THE DOMINION ON THE 30TH APRIL, 1914.

District.	Number of Sheep.		Increase.	Decrease.
	1913.*	1914.		
Auckland	1,340,318	1,475,080	134,762	...
Napier–Gisborne	5,780,201	5,714,526	...	65,675
Wellington – West Coast	6,024,926	5,780,525	...	244,401
Marlborough–Nelson–Westland ...	1,298,287	1,300,316	2,029	...
Canterbury–Kaikoura	5,193,691	5,512,813	319,122	...
Otago	4,554,387	4,812,145	257,758	..
Totals	24,191,810	24,595,405	713,671	310,076
		Decrease, North Island	...	175,314
		Increase, South Island	578,909	
		Net increase for Dominion	403,595	...

* Complete returns.

NUMBER OF SHEEP IN THE DOMINION AND EXPORT OF MUTTON AND LAMB FOR THE PAST TEN YEARS, AT 30TH APRIL.

Year.	Number of Sheep in Dominion.	Mutton Carcases exported.	Legs and Pieces exported.	Lamb Carcases exported.
			Cwt.	
1905	19,130,875	1,888,065	24,088	1,937,026
1906	20,108,471	1,500,773	13,171	2,134,563
1907	20,983,772	1,921,465	37,456	2,519,417
1908	22,449,053	1,821,426	35,663	2,826,437
1909	23,480,707	1,899,446	41,681	2,910,358
1910	24,269,620	1,711,839	52,873	3,423,918
1911	23,996,126	1,979,534	42,624	3,708,468
1912	23,750,153	1,918,119	34,667	3,035,783
1913	24,191,810	2,133,226	20,133	3,181,991
1914	24,595,405*	2,630,962	22,696	3,808,006

* Approximate.

THE DOMINION'S EXPORTS TO BRITAIN.

COMPILED FROM MANIFESTS OF VESSELS SAILED DURING RESPECTIVE MONTHS OF CURRENT AND PRECEDING SEASONS.

Month.		Mutton, Carcases.	Lamb, Carcases	Beef, Quarters.	Pork, Carcases.	Butter, Boxes.	Cheese, Crates.	Wool, Bales.	Wheat, Sacks.	Oats, Sacks.	Rabbits, Crates.	Hemp, Bales.	Tow, Bales.	Kauri-gum, Cases.
January,	1914	231,766	464,185	30,424	33	150,492	136,086	108,742	..	500	2,851	15,234	4,306	11,133
,,	*1913*	*166,714*	*229,179*	*6,886*	*611*	*109,251*	*63,864*	*118,986*	..	*329*	..	*6,969*	*2,215*	*4,110*
February,	1914	354,190	334,207	14,100	3	86,570	59,532	127,372	..	4	..	3,709	633	7,607
,,	*1913*	*326,337*	*403,698*	*12,666*	*54*	*89,098*	*81,733*	*127,968*	..	..	..	*12,520*	*4,295*	*7,973*
March,	1914	446,522	551,313	36,689	..	61,060	62,732	95,175	..	..	..	8,187	2,562	3,958
,,	*1913*	*86,224*	*210,166*	*7,428*	*250*	*47,560*	*59,844*	*49,661*	..	*115*	..	*12,552*	*7,662*	*4,043*
April,	1914	234,765	366,786	22,185	..	7,822	63,796	58,488	..	2,901	..	1,247	888	5,909
,,	*1913*	*303,937*	*647,948*	*16,834*	*457*	*11,358*	*52,934*	*61,988*	..	*300*	..	*9,049*	*3,351*	*3,889*
May,	1914	336,632	638,397	39,315	54	837	37,776	43,364	3,623	11,062	..	8,355	2,112	9,316
,,	*1913*	*418,221*	*731,520*	*22,073*	*100*	*637*	*46,304*	*33,281*	..	*265*	*2,000*	*15,751*	*5,005*	*9,057*
June,	1914	261,877	634,981	36,400	..	1,153	19,247	18,774	..	28,141	1,000	7,924	4,258	7,881
,,	*1913*	*315,034*	*528,815*	*24,444*	*588*	*79*	*3,166*	*18,741*	..	..	*13,072*	*13,592*	*4,065*	*5,439*
July,	1913	215,713	331,353	14,030	..	..	1,687	17,169	5,651	300	9,190	9,682	1,720	10,793
,,	*1912*	*291,097*	*371,474*	*29,457*	*210*	*684*	*1,255*	*16,567*	*44,324*	*23,216*	*20,573*	*7,463*	*1,856*	*5,892*
August,	1913	161,593	178,263	13,129	6	8	407	8,494	11,604	45	38,480	3,714	2,310	6,406
,,	*1912*	*207,239*	*157,589*	*10,478*	..	*559*	..	*10,409*	*42,580*	*38,802*	*19,562*	*3,758*	*523*	*4,219*
September,	1913	133,122	83,521	5,334	16	6,575	2,020	7,176	..	..	16,336	3,826	1,501	10,049
,,	*1912*	*44,657*	*40,759*	*1,174*	..	*8,723*	*1,204*	*6,671*	*15,742*	*17,363*	*19,933*	*2,957*	*501*	*3,671*
October,	1913	14,122	25,735	580	..	42,847	21,452	2,705	..	..	10,020	6,986	3,672	2,923
,,	*1912*	*51,263*	*15,393*	*3,882*	..	*49,962*	*16,389*	*4,647*	*7,952*	*64,480*	*5,396*	*4,193*	*401*	*9,075*
November,	1913	20	1,479	..	..	53,468	23,722	1,891	..	..	2,478	4,162	771	2,314
,,	*1912*	*54,175*	*8,286*	*282*	..	*140,751*	*57,181*	*33,305*	*3,680*	*40,896*	*13,892*	*9,866*	*1,911*	*5,466*
December,	1913	128,087	86,890	8,909	.	249,526	124,821	51,385	..	250	24,479	19,807	5,270	11,273
,,	*1912*	*117,740*	*106,310*	*4,774*	..	*119,885*	*66,213*	*44,789*	*5,868*	*30,490*	*10,070*	*3,816*	*2,613*	*3,686*

LONDON MARKET VALUES.

COMPARATIVE STATEMENT COMPILED FROM THE HIGH COMMISSIONER'S CABLES FOR THE THREE MONTHS ENDED 30TH JUNE, 1914.

London Date.	Wool. Bradford Quotations for Tops. 36's.	40's.	44's.	50's.	56's.	60's.	Mutton. Canterbury.	Mutton. North Island.	Lamb. Canterbury.	Lamb. Other than Canterbury.	Beef. Hinds.	Beef. Fores.	Butter. New Zealand.	Butter. Danish.	Cheese. New Zealand White.	Cheese. New Zealand Coloured.	Cheese. Canadian.	Hemp (Spot). New Zealand Good-fair.	Hemp (Spot). New Zealand Fair.	Hemp (Spot). Manila.	Hemp (Forward Shipment). New Zealand Good-fair.	Hemp (Forward Shipment). New Zealand Fair.	Hemp (Forward Shipment). Manila.	Wheat. Short-berried.	Wheat. Long-berried.	Oats. Sparrowbills.	Oats. Danish.
1914.							d.	d.	d.	d.	d.	d.															
April 4	1/4¼	1/4½	1/5	1/8¼	1/11	2/4¾	4⅝	4½	6¼	6⅛	4 1/16	3¾	108/0	124/0	62/0	64/6	71/0	25/10/0	22/5/0	25/15/0	26/0/0	22/10/0	26/5/0	..	..	..	..
,, 9	..	..	..	..	..	..	4¾	4⅜	6¼	6	4⅜	3⅜	108/0	120/0	62/0	64/6	71/0	25/15/0	23/0/0	20/0/0	..	..	..	..	..	..	..
,, 18	..	..	..	..	..	..	4¾	4⅜	6¼	6	4⅜	3½	108/0	116/0	62/6	64/0	71/0	26/0/0	23/0/0	26/10/0	..	..	26/15/0	..	..	..	..
,, 25	..	..	..	..	..	..	4⅝	4¼	6¼	5 15/16	4⅜	3½	108/0	116/0	62/0	64/6	71/0	27/0/0	25/10/0	28/0/0	..	26/10/0	29/0/0	..	..	..	..
May 2	..	..	..	..	..	..	4½	4½	6¼	5 15/16	4 7/16	3⅜	108/0	113/0	62/0	64/6	71/0	26/10/0	23/10/0	27/10/0	26/10/0	23/10/0	27/10/0	..	..	..	..
,, 9	..	..	..	..	..	..	4½	4⅜	6¼	5 15/16	4 7/16	3 7/16	108/0	114/0	61/6	63/6	71/0	26/0/0	23/0/0	27/0/0	26/10/0	23/10/0	27/10/0	..	..	..	..
,, 16	..	..	..	..	..	..	4⅝	4⅜	6¼	6⅛	4½	3 7/16	108/0	115/0	61/0	64/0	72/0	27/0/0	23/15/0	27/0/0	..	24/15/0	27/10/0	..	..	..	..
,, 23	..	..	..	..	..	..	4⅝	4⅜	6 5/16		4½	3½	108/0	115/0	60/0	63/6	70/0	26/10/0	23/10/0	26/10/0	27/0/0	24/0/0	27/0/0	..	..	..	..
,, 30	..	..	..	..	..	..	4⅝	4 3/16	6⅜	6¼	4½	3½	110/0	116/0	60/6	64/0	70/0	26/10/0	23/10/0	26/10/0	26/15/0	23/15/0	26/15/0	..	..	..	..
June 6	..	..	..	..	..	..	4⅝	4⅜	6 5/16	..	4 7/16	3 7/16	110/0	116/0	63/0	65/0	70/0	26/0/0	23/0/0	26/0/0	26/5/0	23/5/0	26/5/0	..	..	..	..
,, 13	1/4¼	1/4½	1/5	1/8½	1/11¾	2/4½	4⅝	4⅜	6⅜	6¼	4 7/16	3 7/16	112/0	116/0	65/0	66/0	64/0	26/0/0	23/0/0	25/10/0	26/5/0	23/5/0	26/0/0	..	..	..	..
,, 20	..	..	..	..	..	..	4⅝	4⅜	6¼	6 3/16	4⅜	3⅜	112/0	117/0	65/0	66/0	64/0	25/10/0	23/0/0	25/0/0	26/0/0	23/5/0	25/10/0	..	..	..	..
,, 27	..	..	..	..	..	..	4⅝	4⅜	6¼	6 3/16	4⅜	3⅜	114/0	118/0	63/6	64/6	63/6	25/10/0	23/0/0	24/0/0	25/10/0	23/0/0	25/0/0	..	..	..	..

HEMP AND TOW GRADING RETURNS.

JUNE.

Hemp.—The total number of bales graded was 5,904, as compared with 14,584 for the corresponding month of last year, a decrease of 8,680 bales. For the twelve months ending 30th June, 1914, the number of bales graded was 134,876, as compared with 145,661 for the previous twelve months, the decrease being 10,785 bales.

Tow.—During the month 1,975 bales were dealt with, as compared with 5,144 for the corresponding month of last year, a decrease of 3,169 bales. For the twelve months ending 30th June, 1914, the number of bales graded was 43,719, as compared with 50,553 for the previous twelve months, a decrease of 6,834 bales.

Stripper-slips.—During the month the number of bales graded was 23, as compared with 576 for the corresponding month of last year, a decrease of 553 bales. For the twelve months ending 30th June, 1914, the number of bales dealt with was 3,614.

HEMP, TOW, AND STRIPPER-SLIPS GRADED THROUGHOUT THE DOMINION DURING THE MONTH OF JUNE, 1914.

Hemp.

Port.	Superior.	Fine.	Good-fair.	Fair.		Common.	Rejected.	Condemned.	Total.
				High Point.	Low Point.				
	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.
Auckland ..	..	..	358	641	431	69	..	..	1,499
Napier	..	..	76	..	46	19	3	..	144
Foxton ..	..	..	229	1,091	496	118	35	..	1,969
Wellington ..	..	9	239	435	655	262	19	1	1,620
Blenheim ..	..	84	138	..	..	..	..	..	222
Picton ..	..	20	103	..	..	..	..	..	123
Lyttelton ..	..	2	46	..	..	..	..	..	48
Dunedin ..	..	..	13	16	..	..	..	..	29
Bluff	..	..	105	124	8	13	..	..	250
Totals ..	..	115	1,307	2,307	1,636	481	57	1	5,904
Percentages of totals	..	1·95	22·14	39·07	27·71	8·15	0·96	0·02	..

Tow.

Port.	First Grade.	Second Grade.	Third Grade.	Condemned.	Total.
	Bales	Bales.	Bales.	Bales.	Bales.
Auckland ..	10	214	326	42	592
Napier	..	..	18	..	18
Foxton ..	116	147	29	4	296
Wellington ..	..	273	186	3	462
Blenheim ..	116	38	103	..	257
Picton	..	64	..	..	64
Lyttelton ..	..	150	..	..	150
Dunedin ..	..	5	..	..	5
Bluff	15	69	23	24	131
Totals ..	257	960	685	73	1,975

Stripper-slips.—Passed for export: Foxton, 10; Wellington, 13—total, 23.

NEW ZEALAND-SAN FRANCISCO TRADE.

FOLLOWING are the shipments of produce for San Francisco, Tahiti, and Rarotonga, and transhipments for Vancouver from New Zealand, since February last:—

—	"Aorangi," 27th Feb.	"Tahiti," 27th March.	"Moana," 24th April.	"Willochra," 27th May.	"Tahiti,"* 19th June.
Gum, packages	16	8	16	..	29
Seeds, sacks	..	34	301	65	..
Grain, &c., sacks	33	48	48	52	189
Meat, cases	1,299	261	223	350	200
Onions, cases	8	11	5	17	13
Potatoes, sacks	25	22	6	20	18
Sundries, packages	47	229	144	229	236
Butter, boxes	9	7	1	4	3
Hemp, bales	131	484	470	235	130
Frozen lamb, carcases	4	4	3	4	4
,, mutton, ,,	..	..	..	..	..
,, veal, ,,	..	94	104	319	535
,, beef, quarters	..	500	..	200	..
,, sundries, packages	..	..	2	15	28
Timber, pieces	..	..	..	..	..
Fresh fruit, cases	698	9	5	..	12
Wool, bales	..	..	..	..	42

* Live-stock—3 heifers, 22 pigs, 1 mare.

NEW ZEALAND-VANCOUVER TRADE.

FOLLOWING are the shipments of produce for Vancouver and North American ports from New Zealand since February last:—

—	"Marama," 14th Feb.	"Makura," 14th March.	"Niagara," 11th April.	"Marama," 8th May.	"Makura," 6th June.
Butter, boxes	17,406	12,131	9,787	3,753	5,255
Mutton, carcases	100	25	1,545	1,705	165
Lamb, ,,	..	186	317	211	280
Beef, quarters	652	421	354	880	340
Veal, carcases	402	36	20	..	..
Frozen sundries, packages	33	143	114	523	504
Wool, bales	2	104	96	219	418
Grass-seeds, beans, &c., sacks	..	24	262	34	189
Hides and skins, sacks, &c.	2,551	1,320	2,062	3,291	3,417
Onions, cases	2,500	12,026	4,727	320	..
Sheep-skins, bales	161	..	215	128	452
Jam, cases	89	128	110	90	39
Sundries, packages	219	99	2,910	3,038	2,190
Potatoes, crates	38	..	..	..	..
Kauri-gum, packages	300	328	300	480	..
Hemp, bales	..	..	511	122	240
Rabbits, crates	300	..	..	..	10
Timber, pieces	66	2	258	112	40
Eggs, cases	1	..	..	..	..
Meats (canned, &c.), cases	30	503	1,762	245	365
Fertilizers, sacks	..	..	..	..	..
Fresh fruit, cases	..	7	1,256	1,000	..

STOCK EXPORTED.

THE following table shows the numbers and descriptions of stock exported from the Dominion during the month of June:—

Port of Shipment.	Horses.			Sheep.			Cattle.			Pigs.		Dogs.		
	To Australia.	To Pacific Islands.	To London.	To Australia.	To Pacific Islands.	To South America.	To Australia.	To Pacific Islands.	To Montevideo.	To Australia.	To Pacific Islands.	To Australia.	To Pacific Islands.	To London.
Auckland ..	5	8	..	223	315	..	..	77	..	..	78	2	4	..
Gisborne ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Napier ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Wellington	17	1	..	651	..	29	14	3	..	..	22	4	..	..
Lyttelton ..	17	..	5	2,138	..	..	2	..	..	..	..	2	..	..
Dunedin ..	39	..	..	201	..	..	..	..	..	..	..	..	..	..
Bluff ..	48	..	..	290	..	..	..	..	..	..	..	3	..	..
Totals ..	126	9	5	3,503	315	29	16	80	..	..	100	11	4	..

Auckland also exported 52 crates of poultry to Pacific islands.

Following are the particulars of horses exported: Thoroughbreds—1 stallion, 6 geldings, 1 mare, 1 filly; draughts—58 stallions, 1 gelding, 57 mares, 3 fillies, 1 foal; ponies—2 mares; hunters—3 geldings, 1 mare; 5 geldings.

STOCK IN QUARANTINE.

THE following stock were received into quarantine during the month of June:—

No.	Description.	Sex.	Port of Origin.	Owner or Agent.	Address.
			MOTUIHI ISLAND (AUCKLAND).		
1	Shorthorn bull ..	..	Sydney ..	Dalgety and Co. (Limited)	Auckland.
1	Wire-haired fox-terrier	Male ..	Vancouver	Dr. T. Gerald Harpur	Napier.
			SOMES ISLAND (WELLINGTON).		
1	Boston bull-terrier	Female	New York	P. A. Maysmor ..	Wellington.
1	Holstein bull ..	..	San Francisco	R. B. Sayer ..	Dalefield.
			QUAIL ISLAND (LYTTELTON).		
1	Irish wolf-hound ..	Male ..	London ..	Sir George Clifford	Christchurch.
6	Airedale pups ..	Mixed ..	Dropped on voyage	Vacuum Oil Company	,,